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MR. HOOVER'S DEPARTMENT OF AGRICULTURE*

LAUREN SOTH
Des Moines Register and Tribune

IT would be hard to find a human institution so inviting to the efficiency engineer as the United States Department of Agriculture. One can imagine an organization-chart expert rubbing his hands with anticipatory pleasure as he studies the maze of bureaus, services and agencies which make up USDA today. Almost any logical reshuffling is likely to look better than the present tangle.

Our efficiency expert soon finds, once he digs into the thing, however, that it is very difficult to separate organization, as such, from fundamental policies of government. He finds that organization for production of government services in agriculture is quite different from, say, organization for production of automobiles. If he were working out an organization plan for the General Motors Corporation he would be interested, presumably, in only one end: minimum cost of producing cars. He would not be tempted to question whether something else should be produced. But in dealing with USDA, or any other government organization, it is virtually impossible to forget ends and deal only with means.

The Hoover Commission on Organization of the Executive

* This article was reviewed by:
Fred A. Clarenbach, associate professor of political science, University of Wisconsin.
Carl Hamilton, editor of the Iowa Falls Citizen and former assistant administrator of the Rural Electrification Administration.
O. B. Jesness, professor of agricultural economics, University of Minnesota.
Walter W. Wilcox, professor of agricultural economics, University of Wisconsin.
Most of their comments are shown here as footnotes, but I have changed some wording in the text as a result of their suggestions, for which I wish to express my appreciation.

Branch of the Government, in most of its reports, seems to have stuck closely to its organizational knitting. But at a few points—notably on the question of public power development—it has had trouble keeping its members' policy preconceptions from affecting recommendations on structure of the government.

In its report on Agriculture, the Commission evidently tries to avoid changing the character of the services which the Department now performs. But the "task force" which did the spade work for the Commission did not. It had a point of view about the kinds of programs the Department should be conducting, and it took no pains to divorce this view from its organizational plan. Although the Commission itself deleted some of the task force recommendations, the final report still reflects a definite "slant" on agricultural policy in general.

This is inevitable, of course. The writer is not deploring it but simply pointing out that the Hoover plan should not be considered as relating to administration alone. It is also a policy document.

I

The Hoover Commission's plan calls for re-grouping the agencies and bureaus of the Department along functional lines. The purpose (says the Commission) is to "secure more concentration in the responsibility of direction, elimination of overlap, conflict and waste, and further, to make possible the realization of broad policies in the Department." The resulting structure, the Commission believes is "sufficiently flexible to permit programs and activities to be added or dropped without requiring major reorganization."

Under the Hoover plan all the Department's activities would be grouped into seven major administrations, or "services," as it calls them. To help in the guidance of these agencies, the Secretary would have a unit of staff services, with an administrative assistant secretary in charge. These staff services are finance, personnel, management research (continuing studies of economies in operation of the Department), legal counsel, supply, publications, information and library.

Instead of the 20-odd agencies which now report to the Secretary, there would be only seven services—Research, Extension, Agricultural Resources Conservation, Commodity Adjustment, Regulatory, Agricultural Credit, and Rural Electrification. Separate congressional authorities to subordinates in the Department (such

as the Governor of the Farm Credit Administration) would be eliminated.[1]

This sort of re-grouping and fixing of responsibility certainly looks like good sense; it should streamline administration of the Department, make for more unified policies, less red tape and greater efficiency. Many critics of the "loose confederation of independent bureaus and agencies" which is now USDA should be pleased with the Hoover plan.

* * *

Besides re-grouping the agencies of the present Department, the Commission proposes to move into USDA the land management functions of the Department of Interior (except "mineral questions," National park, Indian, and other special purpose lands). This is something every Secretary of Agriculture has wanted to do and every Secretary of Interior has resisted. Henry A. Wallace and Harold Ickes especially used to quarrel over it.

Both the natural resources and agriculture task forces of the Hoover Commission agreed that the Forest Service, the Bureau of Land Management and the public land functions of the Soil Conservation Service should be consolidated. The only argument was about which department they should be in. The natural resources study group argued for Interior, on grounds that it already has similar functions in the National Park Service, the Fish and Wildlife Service, and the Bureau of Reclamation. The agriculture group favored Agriculture, largely because it felt public land management policy should be consistent with *total* national land policy on privately-owned lands.

Since the Fish and Wildlife Service manages some public lands, the agriculture task force wanted to move it into Agriculture, too.

The Commission ruled in favor of the view of the agriculture task force on public land management, except that it left the Fish and Wildlife Service in Interior.

This consolidation, if approved by Congress and the Adminis-

[1] Comment by Fred A. Clarenbach: The Commission in its *General Management* report strongly recommended that the department head be given authority "to determine the organization within his department" and "to assign funds appropriated by Congress for a given purpose to that agency in his department which he believes can best effect the will of Congress." The Commission envisages real departmental control by the Secretary, one foundation for secretarial authority and discipline being (ordinarily) the power of appointment of chiefs of services and bureaus. These recommendations are of high significance for agricultural policy coordination and efficient administration.

tration, ought to result in genuine economies in reduction of overhead, lower administrative costs and in reduction of field offices. It is difficult to see how any logical objection could be made to this unification of public land agencies.

II

In drawing up a chart of Departmental functions, the Commission naturally had to arrive at some arbitrary judgments about classifying present agencies—and about splitting agencies which have more than one function. This was easy for such bureaus as those managing public lands. They obviously fall neatly into the proposed Agricultural Resources Conservation Service.

But where do you classify the Farmers' Home Administration, for example? Is it farm credit alone—or is it extension? Or does it include something entirely different from either of these broad classifications?

The task force decided that FHA is primarily a farm credit agency and placed it into a new Agricultural Credit Service, along with the present Farm Credit Administration and the Rural Electrification Administration.

The Hoover Commission decided not to go along with the task force on REA. In the final report it recommended a separate Rural Electrification Service which would be the same REA under a new name. It apparently was convinced that REA has enough important non-credit functions to justify its autonomy as a separate agency outside the catch-all farm credit organization.

But it backed up the task force on FHA, leaving this agency in the Agricultural Credit Service.

On the surface it appears that FHA would be able to continue operations about as it does now. But the intent of the task force is quite clearly the opposite. It expects a saving of $35,000,000 a year in FHA lending as a result of the reorganization. This must mean a much "tougher" lending policy.

The frequent, gratuitous references of the task force to the need for restricting such loans to "especially qualified" borrowers also indicate where the wind is blowing from.

Nothing in the task force report would indicate that this group recognizes the close supervision of loans and farm family education as an important part of FHA activities. There is more than a little basis for the suspicion that the task force would like to play down

the rehabilitation features of FHA and absorb this agency into the credit machinery for the larger commercial farmers.

This would be not mere reorganization for *efficiency* but reorganization to *eliminate* what has come to be an important function of the USDA—the rehabilitation of low-income farmers through an intimate educational approach, associated directly with the provision of credit. This is what comes of following to extremes the principle of functional organization.[2,3]

It also illustrates how the task force's conceptions of agricultural policy influenced its organizational plan. Putting FHA into an overall credit agency probably would prevent its ever becoming an effective adjustment agency to rehabilitate Southern agriculture and to expedite a shift from cotton and tobacco to livestock.

The Department of Agriculture's numerous programs of crop adjustment, conservation payments, price supports and education (Extension) have all notoriously benefited the top 50 percent of the farmers who produce 90 percent of our agricultural products. The amount of attention devoted to the lower half of agriculture is illustrated by the size of FHA's budget as compared to the budgets of the rest of the Department.[4]

If the Hoover Commission proposals are carried out, the underprivileged in agriculture will be left by the wayside even more than they have been in the past. One cannot conclude that the effect of this change in the status of FHA escaped the attention of the task force simply because it was engrossed in getting a neat pattern of functional units. The explanation must be that the bias of this committee is the same as the bias which has "set the pace" in our agricultural policies over the last 15 years.

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[2] Comment by O. B. Jesness: Some persons fear, on the other hand, that putting the two types of operations (co-operative credit and direct lending) in the same administrative agency will weaken the operations of the agencies which are on a *commercial* basis and tend to bring *them* into the subsidized category. This might be the outcome, but I see no real reason why the man in charge of such a combined administration should not be able to keep the two types of activity separate. This difficulty should not be any greater than that of the Secretary in the event that two separate agencies report to him directly.

[3] Comment by F. A. C.: The intent of the task force on FHA policies seems clear; but simply to place FHA in a Credit Service would not make the adoption of such policies inevitable.

[4] Comment by O. B. J.: If the Department is viewed as an agency dealing primarily with agriculture, rather than with people on the land, then its concentration on the problems of farmers, rather than of people who happen to be living on the land, has considerable justification. Though the Department may have the most effective machinery for reaching people on the land, certain types of public aid may appropriately fall within the scope of other public agencies.

It may be an over-simplification to say the task force represented the Farm Bureau-Extension point of view, but it certainly is fair to say that the proposed action on FHA is not inconsistent with that point of view.

III

In the field of soil, water and forest conservation, the Hoover Commission recommends setting up an omnibus action agency called the Agricultural Resources Conservation Service. It would administer all conservation programs, manage the forests and grazing lands, be responsible for soil surveys and land classifications, and represent the Department in water resources surveys, flood control programs and reclamation projects.[5]

This new Service would carry on all the work now done by the Agricultural Conservation branch of the Production and Marketing Administration, the Soil Conservation Service, the Forest Service, and the Bureau of Land Management of the Interior Department—except that all research activities of these bureaus would go to the new Research Service.

All technical conservation services to farmers would be administered by the Extension Service. The task force report says that the Resources Administration will "see to it that adequate technical service and needed assistance in conservation practices are available through the Extension Service of USDA and the Extention Services of the respective states to soil conservation districts and other organizations and farmers."

This sounds as though all the conservation technicians of SCS would become employees of the Federal and State Extension Services. However, in the table showing transfer of employees, the task force shows these technicians as moving into the Resources Conservation Service. In the text of the report the task force says that the Extension Service would be "strengthened by additions to the . . . force of specialists and technicians who now operate in the field independently of the State Extension Services."

So it is not completely clear who would hire and fire the technicians, but it is perfectly clear that the *intent is for Extension to*

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[5] Comment by F. A. C.: The reports do not indicate how USDA programs are to be co-ordinated with TVA or other river basin or regional organizations. The conflict in the Tennessee Valley over soil conservation districts might largely disappear under the new plan—but the much broader problem of co-ordinating other overlapping USDA and TVA programs meets only silence.

administer the work. It may be fairly said that the task force has adopted the views of the Farm Bureau on this point, also.

The report says a "strong central administration" will carry its educational and service program to soil conservation districts through a "revitalized" Extension Service. But it seems to this writer that some confusion and division of authority still would prevail under this plan.[6]

Neither in this part of the report, nor anywhere else, do the task force or the Commission pay heed to the close affiliation of the Farm Bureau and the Extension Service in a number of states. The "revitalized" Extension Service is supposed to take over all the information and education work of the department, *including technical services to farmers.* It is to be noted that compliance for conservation payments would also be certified by technicians responsible to Extension. Is this good public administration to permit one major farm organization to have a strong voice in determining which farmers get services and payments?

A committee of the Land Grant Colleges and the Department of Agriculture recently reported that this was *not* sound public administration—even for "pure" educational activities. It is interesting to note that the one dissenter on this committee was Dean H. P. Rusk, of Illinois, who served as chairman of the Hoover task force for agriculture.[7]

The task force not only ignores the Extension-Farm Bureau tie-up, it also seems to be unconcerned about the cherished educational freedom of the Land Grant Colleges—their independence from USDA action programs. It assigns Extension an important role in *all* action programs. It recognizes that agencies responsible for "compliance with rules and regulations by citizens who participate in or receive benefits from" their programs must have authority to

[6] Comment by Walter W. Wilcox: The recommendations on Extension-Agricultural Resources Conservation Service relations are fuzzy, certainly. I doubt that we can ever appropriate enough money to get an adequate job of conservation done as long as everyone waits for Uncle Sam to do it. The Commission missed a golden opportunity to recommend policies which would force state and local groups to assume more responsibility in conservation, perhaps through some form of grants-in-aid.

[7] Comment by W. W. W.: The seeming Farm Bureau bias may result from independent farm leaders holding the same views on certain issues. But the omission of any discussion of Extension-Farm Bureau relationships is a major gap in what purports to be a comprehensive set of recommendations. The marital relations of these groups may not be as iniquitous as currently supposed, yet few familiar with congressional opinion on this topic expect Extension to be given important new duties until the marriage is annulled.

publish facts about these programs and interpret them to farmers. But it says Extension is responsible for "extending this information in appropriate ways."

With all the difficulties that arose during the AAA period (when Extension was supposed to handle the educational work for crop adjustment programs) fresh in their minds, it is amazing that this task force could now blandly propose the same thing over again in connection with conservation services and payments to farmers. The only recognition that any problem exists in this area is this statement from the task force report:

"However, when a Land Grant College is unable or unwilling to co-operate in any given project, and the Secretary believes the public interest or the law requires, the project will be carried direct to the farmer by the (Federal) Extension Service or other appropriate agency of the Department."

Most people undoubtedly want their Land Grant Colleges to be free to criticize Department programs and policies. This plan of organization certainly points in the opposite direction. The Extension services in the states cannot be a "service agency for all other Administrations in the Department" and still be free to conduct unbiased educational programs.

IV

For the important jobs of commodity price supports, loans, crop insurance, and crop adjustment programs, the Hoover Commission proposes a new Commodity Adjustment Service. This Service, as recommended by the task force, would be the present PMA, minus its regulatory and market news functions (which go into a new Regulatory Service) and plus the Commodity Credit Corporation and the Federal Crop Insurance Corporation. The Commodity Adjustment Services would be organized into commodity bureaus, except for CCC and FCIC.

The individual commodity bureaus would handle all price support programs, procurement of supplies for foreign relief, etc. CCC, which has in the past administered some of these programs, would only be a service agency for financing the programs.

This implies an organization of adjustment programs similar to that of early AAA days. One would expect, if this is true, that the same sort of conflicts between bureaus representing dairymen and and feed producers, Cotton and Corn Belts, and Wheat and Corn

Belts would develop again. It sounds like the type of organization which T. W. Schultz has criticized as the "department of separate commodities." The Commission's recommendations seem to give little weight to the importance of approaching adjustment problems from the standpoint of the farm business as a whole.

Other than this, there would be no important change in top organization so far as the functions of this Service are concerned.

* * *

However, the Commission recommended two important changes in accounting and budgeting for price support and other programs. It would remove the borrowing authority from CCC, giving it a revolving fund of three billion dollars, from which funds for approved programs would be drawn. Congress in the future would make one appropriation for restoring impairment of capital of CCC and another for administrative expenses of the Corporation.

Another change would remove the authority of the Department of Agriculture to use 30 percent of certain customs receipts for price support. "The earmarking . . . of funds for special purposes has elements of waste, since it cannot be predicted that in any particular year use of all of such funds . . . will be necessary."

* * *

The big change in commodity adjustment programs would be in the field organization. The Commission has recommended a sweeping overhaul of all field services at state, county and farmer levels.

All actual administrative work in the field by all Department agencies—including that now done by county AAA committees—would be performed by regular Department employees. The report recommends, however, that the Department make as effective use as possible of state departments of agriculture on a co-operative basis. In each county, Department of Agriculture Councils, comprising representatives of the different Departmental services, would be organized to exchange information on their programs. "Services at county levels and to farmer units should be so merged as to reduce the number of duplicating and unnecessary employees. . . . Regular field personnel should be jointly housed, wherever practicable."

In addition, the Commission proposes state and county agricultural councils to serve in an advisory capacity on Department pro-

grams. This portion of the plan looks much like the councils suggested in the Aiken bill introduced in the Senate a year ago.

The state council, according to the task force report, would be made up of four ex-officio members: the state secretary of agriculture, the Extension director, the Experiment station director and the head of the state Conservation department. Eight farmer members would be elected by the county agricultural councils.

The county agricultural council would be made up of farmers elected by farm owners and tenants of local administrative units within the county.

These councils would replace all present federal agricultural committees and boards, including the AAA committees, the FHA advisory committees, and so on. They would perform only advisory duties and would be paid only out-of-pocket expenses. They would review and consider all Department programs but would not have a "veto power."[8]

Whether these changes in the field organization would bring about greater unification, less duplication and more local control by farmers could be learned only by actually trying them out. The confusion which exists in many agricultural counties today is ample reason for trying out a new system, and the proposals of the Commission on this score probably will receive considerable support. However, both the soil district commissioners and the AAA committeemen, who have developed highly effective organizations, may be counted upon to resist any attempt to absorb them into a general advisory council.[9]

So far as administration goes, it must be granted that the AAA part-time committees have done a good job. But they have shown tendencies at times to operate like a farm pressure group—most recently in promotion of 90 percent of parity fixed supports in opposition to the sliding scale supports of the 1948 farm price act. The general farm organizations feel that political activity of this

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[8] Comment by W. W. W.: The task force recommendations on field organization may slightly increase co-ordination and integration at the local level—but to expect a locally-elected group of farmers, acting in an advisory capacity, to effectively co-ordinate the work of several different Federal employees hired, fired and directed by different bureaus in Washington is unrealistic.

[9] Comment by F. A. C.: The reports do not make clear what relations between the county agricultural council and the supervisors (commissioners) of the soil conservation districts are contemplated. It seems likely that, with the proposed general advisory council and a different administrative setup for resources conservation, the soil conservation districts would tend to atrophy.

kind is *their* business—and not that of people charged with responsibility of carrying out a government program. By putting all administration in the hands of Department employees and setting up broad advisory councils of farmers this danger of "agency pressure groups" may be avoided.[10]

V

One glaring gap in the task force recommendations is the failure to consider the possible need for food distribution programs on the order of the food stamp plan or the Aiken food allotment plan. The only mention of anything of the kind is of school lunches, and the recommendation in that case is to move the program to the Federal Security Agency.

While the purpose of the school lunch program is primarily social welfare, the purchasing of food would be done by the Department of Agriculture in any case. In a severe business recession, we are almost certainly going to carry on food distribution programs on a large scale—not as a welfare measure alone but also as a means of supporting farmers' incomes. This is strictly USDA business. It is directly related to other farm programs, crop adjustment especially. It would seem wise to this writer to prepare for such programs in the Department of Agriculture. An organizational framework should be ready, and experimental programs should be underway now—so that the worst blunders could be avoided if and when the time came for large scale action.[11]

But the Hoover Commission and its task force either (1) ignore

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[10] Comment by Carl Hamilton: The Hoover report recommends abolition of the AAA farmer-committee set-up. Soth commends the committees for their good job but, recognizing their "tendencies to operate like a farm pressure group," appears to "go along" with the Hoover recommendation. There are two things to be thought about here. Although it may be wrong in theory, strong agencies of government have always developed ways and means of making their thinking known and felt. The U. S. Forest Service is one of the best organized, most efficient agencies in the federal government. Yet few groups, either in or out of government, can surpass it in ability to accomplish legislative objectives. But it does not operate in the Farm Bureau's field—which makes a lot of difference.

Furthermore, the clamor in this day of big government is for decentralization. The Hoover report itself cries out for more of it. Yet here in the AAA committees we have one of the first serious attempts to place administration in the hands of farmers themselves and—because the farmers show tendencies of operating like every other government agency—we would junk them at the first opportunity.

[11] Comment by O. B. J.: I am less certain that food distribution is a function of USDA. Soth seems to regard food distribution as a matter of surplus disposal. I lean in favor of food distribution guided by dietary considerations and see considerable merit in having them administered outside USDA.

the possibility of such programs, (2) prefer that even large scale food distribution be handled by another department, or (3) prefer crop restriction, foreign "dumping" or other income-support measures to domestic food subsidies.

There are some good reasons why separation of consumer and producer interests is desirable in the Federal government. But the task force was not concerned with this problem in its recommendation that all food and drug inspection and regulation be in the Department of Agriculture. So here again the failure of the task force to provide for an organization oriented to probable future agricultural problems indicates a bias and a particular point of view on general farm policy.

VI

On the whole, the Hoover Commission's reorganization plan appears to promise some real gains in orderly administration and efficiency. It would establish a chain of command and neat functional compartments worthy of military organization.

But it is this very rigid adherence to a functional concept that leads into some blind alleys.[12]

In some of the new Services there would be little chance for effective *combination of functions* where needed. The Farmers Home Administration is one example. The unified administration of the Soil Conservation Service is another. It would be a miracle of cooperation if the Farm Credit Administration and the Extension Service could work together to accomplish the same fusion of education and credit that FHA has achieved. It would be even more miraculous if two agencies, Extension and the proposed Resources Administration, could do as good a job of helping farmers develop conservation plans as SCS has done by itself.

Thus in splitting some programs up into their functions, the Commission plan might contribute to inefficiency rather than efficiency.

[12] Comment by C. H.: A neat organizational chart is of much less significance than a clear recognition of the various fundamental jobs that must be carried out by the USDA and its close associates, the Land Grant Colleges. Crises will come and go, and new action agencies will be added and eventually amalgamated in the Department. Time will look after those problems. But until organization specialists can approach their assignment in the Department with clear realization of the paramount importance of distinguishing (and separating) "research," "education" and "action" nothing really fundamental can be accomplished. Apparently the Hoover group did not make that distinction.

MEASUREMENT OF AGRICULTURAL PRODUCTION

CHARLES F. SARLE AND THOMAS C. M. ROBINSON*
Bureau of Agricultural Economics

THE measurement of agricultural production was one of the original activities of the Department of Agriculture when it was organized in 1862. This statistical service was begun after several decades of earnest discussion and promotion by leading farmers, agricultural societies, and the farm press for unbiased information on major crops during the growing season, harvested production, and numbers of livestock on farms. These farmers wanted protection from the effect of false and misleading reports emanating from those who wished to buy their products at low prices. The published series of agricultural production for the nation and by states began with the year 1866—82 years ago.

Scope of Published Statistics Concerning Agricultural Production

At the present time the Bureau of Agricultural Economics publishes throughout the year statistical reports giving current national and state estimates of production, stocks and prices received by farmers for more than 150 farm products. These reports include estimates of acreages of various crops the farmer intends to plant (March), acres planted for harvest (July) and acreages harvested (December). During the growing season monthly forecasts of production are made on the basis of reported crop conditions on the first of the month. Conditions of pasture or range are reported monthly by states. Production is estimated for 136 crops, including fruits, nuts, vegetables, and field crops.

Statistics concerning livestock and poultry production include annual estimates of numbers and classes of livestock and poultry on farms January 1, and annual estimates of calf and lamb crops and chickens and turkeys raised. Estimates of hogs raised are made twice a year, in June for the "spring" pig crop (December 1 to June 1) and in December for the "fall" pig crop (June 1 to December 1). The volume of milk and eggs produced is estimated monthly, and that of wool and mohair annually. The number of chicks hatched is estimated monthly. A complete enumeration is made

* Paper presented at joint session of American Statistical and American Farm Economic Associations, Cleveland, Ohio, December 29, 1948.

each year of the factory output of about 45 different kinds of dairy products. Monthly and weekly estimates are made currently for the more important dairy products.

Forecasts and estimates of agricultural production are made for the nation and for each of the 48 states. County estimates for a few major products are published annually in nearly all states, and for most of the important products in 16 states. In 12 of these, county estimates are based on an annual Assessors' state farm census of crop acreages. The Federal Census provides county statistics in considerable detail for all states at 5-year intervals.

Except for a few minor agricultural products the present program of the Bureau provides current measures of agricultural production. Two fields that are only partially covered are market-garden vegetables grown adjacent to metropolitan areas and bush fruit crops. A start is now being made for the New York City area where more than 50 different vegetable crops produced locally are sold in the New York City market. A beginning has also been made in the Boston area. These beginnings were made possible by the designation of RMA and state funds for a complete census of market-garden crops in these two areas.

These measures of production are not the only estimates prepared by the Bureau of Agricultural Economics. Such subjects as crop utilization, farm employment, wage rates, farm accidents, and price indexes are outside the scope of this paper although they would certainly be listed in any catalogue of Bureau subject matter.

Timeliness of Agricultural Production Statistics

Current series relating to agricultural production for the United States and for each of the 48 states—intentions to produce, prospective production, and estimates of production—must be *timely* to be of maximum value. For example, the monthly crop reports relating to conditions as of the first of the month are issued between the 8th and the 10th of the current month, the twice-a-year reports of hog production (The Pig Crop Reports) are issued within 18 to 20 days of the end of the 6-month period covered by the report. Somewhat more time (about 6 weeks) is allowed for the December report of harvested acreages and production of all crops. For more than 80 years the public has been accustomed to this kind of "timetable."

In the case of quick-growing vetegable crops, the need for timely

information is so great that monthly reports are supplemented by a semi-monthly publication called the "Truck Crop News." This publication carries pertinent and timely information as to the progress of the various commercial vegetable crops in competing states or areas. Conditions referred to are as of the first and fifteenth of each month, and the release is made on or about the 6th and the 20th. Release is simultaneous from the field and Washington offices and previous review of the state material in Washington is not required. Each field-office release carries information on crops in competing states, whereas the Washington release is a national summary.

Measures of anticipated, current, and realized agricultural production are of five general types:

(1) *Intentions* to produce the principal spring-sown crops are estimated in March, based on farmers' reports of acreage intended to be planted to the different crops. Intention reports are obtained in June and December for fall and spring farrowings (pigs), in January for turkeys raised, and in February for chickens raised.

(2) *Forecasts* of yield per acre and/or production are made monthly during the growing season for each crop, based on farmers' reported condition of the crop in percentage of a "normal" or "full' crop on the 1st of the month, and on estimates of crop acreages made July 1 for spring-sown crops and December 1 for winter wheat and rye.

(3) *Current estimates* of yield per acre and/or production are made at completion of harvest. Revised estimates of acreage, yield, and production of all crops are made the middle of December each year.

(4) *Revised estimates* are made after the close of the marketing season and, except for cotton, tobacco, peanuts, sugar beets, and sugarcane, are not published until the following December crop report.

Revised estimates for cotton, tobacco, sugar beets, and sugarcane are published in May, and peanut revisions are published in July. These revised estimates for all crops are made ex post facto, or historically. They are based primarily on commercial marketings, shipments, volume processed or handled, and other commercial or PMA data that are available and reasonably complete, and on the Annual Assessors' State Farm Census in the few states in which an historical enumeration of acreage or production is made. These

commercial check data include cotton ginnings, peanut shellings, tobacco sales, reports from sugar manufacturing companies, fruits and vegetables canned and processed, carlot shipments of fruits, vegetables, livestock and grain, records on numbers of livestock assessed for taxation, market receipts of livestock and other agricultural products, quantities of certain agricultural products processed for sale, plant production of manufactured dairy products, and state inspection records of livestock movements, slaughter, and inventory counts.

(5) *Final revised estimates* are made every 5 years after Federal Census data become available. This revision involves the *level* of the annual estimates for the last 5 years. Federal Census data are adjusted for incompleteness and also to get back to a January 1 basis in the case of livestock inventories. The adjusted Census data are then relied on rather heavily in the case of those agricultural products for which commercial check and other information is inadequate or not available. Examples are agricultural products that are largely consumed on the farm or shipped primarily by truck rather than by rail.

Intentions, forecasts, and current estimates are based almost entirely on returns from voluntary mail sampling, interpreted by means of regression, that is, the historical relationship of the revised or final revised estimates to the sample averages and ratios. In a few important states in which the Assessors' State Farm Census is taken in the spring and relates to the acreage of crops planted, or to be planted, a sample of these data by townships is used in estimating crop acreages for harvest on July 1, and in the fall a mail survey of farmers reporting on the spring State Farm Census is used to bring crop acreages planted, or intentions to plant, to an acreage-harvested basis.

Methods of Sampling

A—VOLUNTARY MAIL SAMPLING: Two types of observations are used with mail questionnaires, (a) judgment-for-the-locality observations for condition of the growing crop and pasture expressed as a percentage of a "normal" or "full" crop, probable yield, and harvested yield per acre, and (b) individual-farm observations for crop acreages, numbers of livestock, farm stocks, utilization of livestock, and acreage-and-production to obtain a derived yield per acre after harvest. The individual-farm observation relates to the

reporter's own farm, whereas the judgment-for-the-locality observation relates to the farms in the locality where the reporter lives.

Voluntary mail samples fall into four general categories, the first three of which are as follows:

(1) *Regular monthly reporters* receive a general crop and livestock questionnaire the first of each month. Items on these monthly questionnaires are predominantly judgment-for-the-locality type of questions on crop and pasture conditions, yields per acre, etc., but they also include individual-farm observations on the rate of milk and egg production, farm stocks quarterly, farm employment and wage rates, etc. This regular monthly reporter list of about 80,000 farmers returns on the average about 24,000 questionnaires, or 30 percent.

(2) *Individual-farm reporters* receive crop-acreage questionnaires in March on intentions to plant, in June on crop acreages for harvest, and in the late fall on acreage and production. In January they receive a livestock disposition questionnaire. These questionnaires are sent to about 320,000 farmers. On the average, about 80,000 usable schedules are returned, or 25 percent. In many states the regular monthly reporters are also included in making these individual-farm inquiries.

(3) *The rural mail carriers* of the Post Office Department distribute about 600,000, unaddressed individual-farm cards to farmers along their routes three times each year—in June and December on livestock and in October on crop acreages harvested. About 160,000 cards or 27 percent are returned and tabulated.

The voluntary mail samples described above are what might be called "general-purpose" samples. The questionnaires used include a considerable number of the more generally grown agricultural products and they are sent to a general list of farmers in all agricultural counties in each State. In addition, *"special-purpose" mail sampling* is used in forecasting and estimating acreage, condition, yield and/or production of important commercial crops and classes of livestock for which an adequate sample cannot be obtained by general-purpose sampling. Examples are commercial fruit, nut, and vegetable crops; such field crops as tobacco, dry beans, broomcorn, sugar beets, sugarcane, and seed crops; cattle and lambs on feed, sheep, cattle, and goats on ranches, wool and mohair produced, turkeys, broilers, non-federally inspected slaughter, grain stocks in mills and elevators, chicks hatched, and, in a few states, monthly

egg and milk production. Mailing lists of these special producers and processors are maintained in the Agricultural Estimates Field Offices.

Population characteristics of agricultural producers that require "special-purpose" sampling may be summarized as follows:

(1) The populations are small in size compared with all agricultural producers in a state; consequently, the frequency of occurrence is low.

(2) The production is usually geographically concentrated in one or a few areas because of special soil, marketing and especially climatic requirements of these agricultural products.

(3) Some of these agricultural specialties have a sporadic distribution in space, and a few are sporadic in both space and time; for instance, in-and-out cattle and lamb feeders, producers of certain commercial vegetable crops in some states, and producers of such seed crops as clover and bluegrass.

(4) A relatively small proportion of the larger growers usually produce a high proportion of the total production. For example, in New England less than 10 percent of the farms on which chickens are raised produce more than 70 percent of the eggs.

Geographic stratification and weighting are used with the voluntary mail samples. A typical state is divided into nine "crop-reporting districts" and weights are based on data from the last available Census, Federal or State. These crop-reporting districts are delineated in a more or less arbitrary manner with about an equal number of counties in each district. In a few states, consideration has been given to type-of-farming areas in making this stratification. But as one system of stratification is used at present for practically all agricultural products, probably little would be gained from a more refined method of geographic stratification.

Research is now under way to determine the statistical efficiency of the present method of stratification, and whether a somewhat different stratification might not be used to advantage with different important agricultural products in some states. In a few states an additional stratum of "large farms" (1,000 acres and over) superimposed on geographic stratification has served to increase the stability of acreage ratios obtained from voluntary individual-farm mail samples.

B—FIELD OBSERVATIONS AND PERSONAL CONTACTS WITH COMMERCIAL PRODUCERS: BAE statisticians make general field observa-

tions of crops during the growing season and have personal contacts with well-informed growers, livestock producers, and other "key" people who buy or handle farm products, or extend credit to farmers. These personal contacts are practically indispensable with the agricultural products which require "special-purpose" sampling; in evaluating the damage done to crops by hurricanes, freezes, floods, hailstorms, or droughts; and in estimating cattle and sheep on feed.

C—OBJECTIVE PLANT COUNTS AND MEASUREMENTS: Objective plant counts and measurements are made with certain important commercial and feed crops in the fields in which these crops are growing. Objective sampling methods are used in selecting the fields to be sampled and in selecting the small "sample areas" for harvest. These methods have been used with wheat, corn, cotton, potatoes, peanuts, and soybeans. For citrus fruits "frame counts" are made in California and Florida in selected groves to determine the number of fruits on trees in comparison with previous years. Diameters of representative fruits also are measured to obtain an index of size. The crop meter, which is attached to the speedometer cable of an automobile, has been used to measure the crop frontages along selected routes each year to provide an indication of acreage change in various crops from year to year in certain areas of the country where this technique is practicable.

D—PRE-SELECTED INTERVIEW SAMPLING: In recent years interview area sampling has been successfully used to a limited extent in making estimates of certain kinds of agricultural phenomena for which voluntary mail sampling is not especially appropriate. Examples are family and hired labor employed on farms, farm wages, farm accidents, farm income and expenses, farm machinery, and farm practices, including the use of credit, fertilizer, and various marketing channels.

A 15,000 farm nation-wide farm-interview survey was made in January 1947, a 12,000 farm sample in April 1948, and a 10,000 farm sample in September 1948. In the first two surveys, area segments were enumerated in more than 800 counties by about 450 local interviewers under the direct supervision of the agricultural statisticians in the 41 Agricultural Estimates Field Offices. Because of limited resources the October 1948 survey was confined to 400 counties and covered only farm employment and wages and farm

accidents. The other two surveys were made with a longer schedule which required on the average about one hour of interview time. Increasing operating costs make necessary proportionally increased appropriations if nation-wide interview surveys are to be continued.

Objective sampling of this kind makes it possible to obtain a representative cross-section sample of all kinds of farms and farm operators that can be expanded directly into an estimate, even without use of Census data for expansion. In the case of a good many agricultural phenomena voluntary mail sampling requires the use of regression methods of estimation using the average relationship between an historical series of revised estimates and the historical series of sample averages or ratios. The sampling error of estimates made from an objectively taken sample can be determined and frequency distributions and various cross-classifications can be constructed as well as aggregate estimates. With voluntary mail sampling, on the other hand, the sampling error cannot be measured by any statistical methods as yet developed and estimates can be made only in terms of totals and such averages as yield-per-acre, milk production per cow, or rate of lay per hen. Furthermore, a good deal more information can be obtained with an interview sample than with a mail sample. In general, a mail questionnaire must be kept short and simple or the returns will be very small and highly selective.

On the other hand, mail sampling, accompanied by regression estimating has certain advantages over interview sampling. It is much less expensive, and estimates can be made from a nation-wide mail sample in from 8 days to 6 weeks, whereas an interview sample requires several months, depending upon the length and complexity of the schedule and the adequacy of machine-tabulation facilities. With present resources, BAE is limited very largely to the use of mail sampling.

E—"SEMI-CONTROLLED" AND "CONTROLLED" MAIL SAMPLING: Selectivity in returns from mail sampling usually introduces bias in the final results unless some sort of control is exercised. "Semi-controlled" mail sampling differs from "uncontrolled" mail sampling in that the returns are stratified and weighted to minimize the effect of *differential response*. Differential response in a mail sample may be associated with one or more characteristics of the population sampled, such as age or education of the operator, type

of farm, size of farm, size of the individual farm enterprise (number of hogs, dairy cows, acres in a specified crop, etc.), capacity of a processing establishment or hatchery, etc. In addition to using such control information for stratifying and weighting the returns, we can go a step further and use the information to design the mailing list in such a way as to achieve a more nearly optimum allocation of returns from the various strata than would be obtained from an uncontrolled selection of names. Population characteristics used for these purposes must be known for the entire population, or at least for a representative cross-section of it, preferably for a recent date. If the information is to be used in designing the mailing list, it must also be available in advance of making the survey. The particular characteristics that are used as controls must be correlated with the items that are estimated from the sample if they are to be effective.

An Assessors' State Farm Census, an interview survey such as the ones made by BAE in January 1947 and April 1948, or similar sources of information may be used to provide the necessary control information. The "semi-controlled" mail sample is then obtained by circularizing all, or a properly designed sample, of the names so obtained. Returns are then stratified and weighted by one or more known characteristics of the population that are correlated with the items to be estimated. When that is done we have a "semi-controlled" mail sample, or one that is corrected at least in part for the selectivity that is inherent in a mail sample.

During the last 18 months, BAE has successfully experimented with "semi-controlled" mail sampling. For example, in June and July 1947 and again in January 1948, short schedules were mailed to the respondents of the January 1947 interview survey. Returns from two successive mailings were 70 percent in June, 60 percent in July, and 55 percent in January. These returns were much larger than those usually obtained in mail sampling. From the July survey an estimate was made for REA of the number of farms electrified and not electrified.

Complete control of a mail sample may be achieved by interviewing a properly designed sample of non-respondents to the mail survey. This procedure has been used only to a limited extent in our organization, but it shows considerable promise as a tool for detecting biases that may not be completely eliminated by the

"semi-controlled" process and for making necessary adjustments in mail returns. A "controlled" mail sample is actually a combination of mail and interview sampling.

"Controlled" mail sampling offers promising possibilities in connection with "special-purpose" sampling of small but commercially important agricultural populations or for the small strata of the large producers in such populations who account for a very large percentage of the total production. In fact, "controlled" mail sampling is now used to a limited extent by some of the BAE Field Offices.

Methods of Estimation

Forecasts and current estimates have been made by regression methods since about 1930 for practically all agricultural products except the fruit crops, and even there the regression method has been used for citrus and pecans. Relationships between the historical series of revised estimates of acreage, numbers of livestock, yields-per-acre, etc., and the historical series of crop-acreage ratios to land in farms, average number of each species of livestock per farm, yields-per-acre, etc., obtained from the voluntary mail samples described earlier in this paper, are shown on scatter diagrams. The "regression line" actually used is "fitted" by the statistician when he makes the forecast or current estimate by means of a hair line centered on a transparent ruler. In this way allowance may be made for trend, or change in the relationship over time, and greater weights may be given to previous seasons which seem to be most nearly comparable with the current season.

Unlike other crops, in forecasting the cotton crop the Board estimates production, and the yield per acre is derived by dividing the estimated production by the indicated acreage for harvest. Instead of estimating the yield per acre and multiplying this figure by the acreage for harvest to obtain production, it has been found that some precision is gained by correlating indexes of production with actual production. The index of production based on the reported condition is obtained by multiplying the condition times the weighted par yield (that is, the yield corresponding to 100 percent condition) times the current acreage for harvest. The production index for the reported yield per acre is simply the product of the reported yield and the current acreage for harvest. The level of both reported condition and the yield per acre tends to be a func-

tion of the acreage level, resulting in some gain in reliability of the estimates and considerable saving in time required in making the estimates.

Condition and probable yield of cotton as reported early in the season do not adequately take into account the level of boll-weevil damage. An index of loss caused by weevils, based on the reported weevil infestation, therefore is used as an additional variable in the forecasting procedure. Use of this second factor, which involves multiple correlation, results in a significant improvement in the accuracy of early season forecasts.

Beginning in October, about 50 percent of all ginners report the number of bales expected to be ginned after that date in addition to reporting the number of bales ginned to date. These data are used to calculate the percentage ginned to date. This figure is expanded to an estimate of production in two ways. In one procedure the derived percentage ginned is correlated with the actual percentage ginned to remove the bias. The estimated ginnings to date are then expanded to 100 percent using the correlated percentage ginned, the estimated bale weight, and the cross-state ginning correction. This index of production is charted against actual production. In the other procedure, the estimated ginnings to date are adjusted to 100 percent based on the ginners' percentage ginned as originally calculated, the reported bale weight, and the cross-state factor. The one regression of production on this index removes the bias. The latter procedure is proving to be the more satisfactory. As the ginning season progresses, more and more weight is given to ginners' indications in adopting production estimates.

In the winter wheat area of the southern Great Plains, precipitation during the autumn months is of vital importance in starting the new seedings. Therefore, charts of final yields against September–November precipitation are used in preparing the December forecasts of the following year's winter wheat yield. In each of the spring and early summer months until harvest, cumulative precipitation charts are used in much the same way. Similarly, April precipitation is used in May to forecast potato yields in Virginia. In a number of states in the northeastern fourth of the country final potato yields are highly correlated with pasture condition during the early part of the season; in those states, pasture condition is used as a separate indicator of prospective potato yields.

The interesting thing about all of these methods is that they rep-

resent departures from sole reliance upon reported condition and probable yield of the crop in forecasting production. In the case of many other crops, as has already been noted, processing or marketing data are considered *after harvest* has been completed in arriving at a final or revised estimate of production. Sometimes such data are used on an absolute basis, as in the case of cotton ginnings; sometimes when not all of the crop is accounted for, as is the case with truck crops, regression charts are used.

Research is being undertaken to determine whether a more objective method of fitting the regression line and allowing for trend and other factors would increase the accuracy of forecasts and current estimates; and also to determine whether, in addition, the regression of revised estimates on forecasts and current estimates of production would improve accuracy. Another research project has been planned to determine whether the accuracy of forecasts of yield-per-acre at harvest could be improved by using, for more crops than at present, other factors in addition to reported condition of the crop or probable yield per acre, such as weather factors that might reflect test weight in the case of small grains, shelling percentage and moisture content in the case of corn, or weight of the leaf in tobacco.

Considerable research was done during the late '20s and early '30's exploring the relationships that might exist between available weather factors before or during the growing season and harvested yield-per-acre of important crops. Use of precipitation data in forecasting yields of wheat and potatoes is a result of such research. It was found, however, that for most crops the appearance of a crop as reflected in the reported condition served as an "integrator" of previous weather effects and gave as high or higher correlations with harvested yields as did any of the combinations of weather factors to the date (the first of the month) when the condition of the crop was reported by crop correspondents.

However, further research is needed in approaching the problem from the standpoint of using appropriate weather and other factors in *combination* with the reported condition. Factors that might be considered are pre-planting-period rainfall, advancement of the crop, and rainfall during the last week or 10 days of the month. It is possible that the most recent weather has not been fully reflected in the appearance of a crop on the first of the month. Similar studies of weather effects might establish significant relationships with

yield for the first week in the month, thereby making it possible, although not necessarily desirable, to bring the forecast of crop production more nearly up to date when it is released on the 8th to the 10th of the month, whereas now the forecast relates to the condition of the crop as of the first of the month. If reliable weather forecasts for the remainder of the growing season were available, the accuracy of within-season forecasts of yield and production undoubtedly could be increased.

Research has already been undertaken for the purpose of making fuller use of "semi-controlled" mail sampling from the Assessors' State Farm Census data in some of the states in which these censuses are taken each year. For example, in Iowa estimates of the number of sows farrowing each month are being made experimentally with marked success. The questions are asked on the General Schedule, but control information for the farms involved comes from the Assessors' Census.

Since the late '20's "matched" or "identical" farm samples, that is, a comparison of current reports from the same farms from one year to the next, have been used as an additional indication of year-to-year changes in crop acreages and livestock numbers. A matched sample of this kind is essential in states where the number of "bona fide" farms is small or where the agriculture is extremely diverse and specialized, to provide some semblance of stability in the individual-farm samples of crop acreages and livestock numbers. Unfortunately, the smaller matched mail sample is often more selective of the more cooperative and progressive farm operators than is the larger unmatched mail sample, and it may be more biased on that account. It is doubtful whether a matched sample should be given much consideration when the sample returns are adequate to provide stability in crop acreage ratios to land in farms.

As suggested a moment ago, regression methods are not so widely used in the estimation of fruit crops as in the estimation of field crops. It is true that they are used regularly for citrus and pecans and experimentally for a number of other fruits. Frame counts are also used for citrus. For most other fruit crops, however, production is still estimated directly by the so-called "par" method, a variation of which was also used from 1912 through 1929 for field crops. As currently employed in the estimation of fruit production, the method consists essentially of the computation for each state of an assumed 100 percent or full production for a given year on the

basis of the relationships in recent years between estimated production and average reported production as a percentage of a full crop. The calculated full crop is called "par." Early in the season of the given year, the reported condition as a percentage of a full crop is converted to probable production as a percentage of a full crop by regression methods, and the resulting percentage production estimate is multiplied by the "par" to obtain an estimate of the probable size of the crop in absolute terms that is, in bushels, boxes, barrels, or tons. Similar procedures are run through each month until the last month of the season, when the reported production as a percentage of a full crop is applied directly to the "par."

Bias in Mail Samples

Mail samples are subject to an unknown degree of bias because of the selectivity in the returns received, and the fact that the mailing list, except in "semi-controlled" or "controlled" mail sampling, is ordinarily not a true cross-section of the population sampled. The population of farm operators may be thought of as forming a pyramid with the more cooperative and progressive farmers at the top. The mailing lists used in sampling are composed in large part of the farmers who do cooperate by returning mailed questionnaires, at least occasionally. The returns of a mail sample may be considered as coming from the top part of such a pyramid; these operators have larger farms and more livestock than the average farmer; they more readily adopt new farming practices and new crops, use improved varieties of seed and more fertilizer than the rank-and-file; and generally they are the farmers who also cooperate with the agricultural county agent.

From the standpoint of judgment-for-the-locality type of observation, farmers from the top of the pyramid are preferred, leading farmers who are acquainted with what is happening in their locality. However, in individual-farm sampling of crop acreages and livestock numbers a more nearly representative cross-section sample of farm operators is needed than can be obtained by uncontrolled mail sampling. The more progressive and cooperative farmers may not change their crop acreages or numbers of livestock at the same rate as the "rank-and-file." They may be more or less sensitive, to the impact of economic or natural forces that affect the profitableness of their operations.

To the extent that the bias of a mail sample remains constant,

the regression method of estimation has proved reasonably satisfactory, even with many of the minor crop and livestock items, as evidenced by a comparison of estimates with census enumerations. It is least satisfactory for new crops introduced in a state for which no adequate independent indications are available for use on a regression basis. Where new high yielding varieties are rapidly introduced or where fertilization or chemical weed control is used more generally to increase production, an additional variable must be introduced for forecasting yields.

The problem is this: in the early stages of the introduction of a new crop or farming practice, statisticians ordinarily can not know the extent, or perhaps even the direction of, the bias present in mail samples. Our theoretical model of what happens is something like this: "In the early stages a mail sample tends to overestimate the acceptance of the new crop or practice, and then after the farmers who inhabit the top of our pyramid have pretty generally adopted the improved crop or practice, the rank-and-file farmer becomes interested and 'follows suit.' Consequently, the mail sample shows little or no increase at a time when the rank-and-file farmers are increasing rapidly. This situation can be visualized by super-imposing a growth curve representing the acceptance of the new crop or practice by farmers who inhabit the top of our pyramid on another growth curve representing acceptance by the entire population. The first starts upward at an increasing rate while the second is getting slowly under-way; the first begins to level off while the second is increasing at a rapid rate."

Let me repeat, this is a theoretical model and although applicable in modified form to a good many situations, to many other situations it is completely inapplicable. Let us suppose that a new pasture or hay crop comes into an area because it does well on poor land. Lespedeza in Missouri is an actual example. Insofar as the farmers on the poor land may not be adequately represented in our voluntary mail sample, the increasing importance of the new crop is underestimated in our sample indications. Furthermore, it is very probable that the time-lag in adoption of new crops and practices by the "poorer" or less progressive farmers in a given area is much less than our theoretical model envisages. The tremendous reliance on the radio as a source of technical information has no doubt reduced the relative advantage enjoyed by the better-educated farmer who reads the experiment station bulletins

and utilizes the advisory service of the county agent. Furthermore, there is a growing practice among the seed companies to test their new varieties and hybrids in each area before making the seed available commercially in that area. This means that adequate supplies of seed become available to all would-be users much more nearly simultaneously than was the case when seed companies permitted their product to go into areas to which its adaptation had not been tested.

Obviously, our theoretical model is an over-simplification, the uncritical use of which would be dangerous. Under circumstances of rapid technological change such as we have just been describing, some independent and unbiased indication is absolutely necessary for the making of reliable estimates. In the dozen or so states in which we have state Assessors' Censuses, unbiased information as to acreage can be obtained, and in a few of them information as to production as well. In the great majority of states, however, no complete enumerations of any sort are made between quinquennial Censuses of Agriculture. Complete marketing or processing checks are possible with relatively few farm products. Having neither an Assessors' Census nor a complete production check, a state in which a new crop, variety, or practice is spreading must ordinarily resort to one of the four following techniques:

(1) Pre-selected interview sampling,
(2) Objective plant counts and measurements,
(3) Controlled mail surveys,
(4) Semi-controlled mail surveys.

The decision as to which of these to use depends upon availability of the representative lists necessary for controlled or semi-controlled mail surveys, funds available, and accuracy of information obtainable from individual producers. In ascending order of cost the methods are semi-controlled mail, controlled mail, pre-selected interview, and objective plant counts and measurements. The last method is ordinarily used where the individual farmer may not know the answers for his own farm. For example, in parts of the South where most of the corn is fed without being cribbed there is a widespread impression that most farmers never know how much corn they have produced, even at the end of the season. If this is true, even a complete census may give erroneous answers. The solution to this problem is an objective pre-harvest survey in

which a representative sample is laid out, and the corn from measured areas is harvested and weighed. Such a survey was made in Alabama during the recent autumn, and preliminary results indicate that the yield, as estimated from the General Schedule indications, is at approximately the right level.

Reliability of Forecasts and Current Estimates

A research project is under way in the BAE to evaluate the accuracy of forecasts and current estimates of agricultural production for the United States and by states for the purpose of determining, as well as available data will permit:

(1) The level of accuracy of various forecasts and current estimates;
(2) The increase in accuracy over time;
(3) Any systematic error in the United States and state forecasts and current estimates;
(4) The gain in accuracy in forecasting and estimating resulting from the use of current survey indications for the crop or livestock item in question, rather than merely carrying forward Federal Census data, the previous year's final estimate, or a trend computed from previous years' final estimates.

It is theoretically possible that in the case of very minor crops or livestock items in some states the use of current survey indications from "general-purpose" samples may not give any more accurate forecasts or estimates than the rough methods which would have to be resorted to if such survey data were not available. If that situation is discovered, a change in estimating methods will probably result, for the current expenditure of time and funds in the making of the survey will not be justified. Systematic errors at either the state or the United States level obviously would call for corrective action to minimize such errors in the future.

The methodology of the current appraisal is relatively simple. Forecasts and current estimates are compared with revised estimates made after the current year's production has been marketed or has become carry-over. The degree of independence in source data such as between current estimates and final revised estimates varies greatly among crop and livestock items. The greater the independence the more valid the appraisal of accuracy when forecasts and current estimates are compared with final revised esti-

mates. In the case of agricultural products that are consumed largely on farms and commercial agricultural products for which inadequate check data on shipments, marketings, or amounts processed are available, a comparison of forecasts and current estimates with final revised estimates will not be very meaningful, and, in fact, will amount to an appraisal of "internal consistency." All forecasts and current estimates are evaluated in comparison with the final revised estimates unless the use of the earlier revised estimates provides a more valid comparison of year-to-year change. The "departures" of forecasts or current estimates are expressed both in units of measure (bushels, bales, barrels, etc.) and as a percentage of the final revised estimate. Similar comparisons are made of the change from the previous year's revised estimate. A "direction score" is also calculated which measures success in forecasting the direction of change expressed on a scale from zero to 100 percent. This is the proportion of the forecasts or current estimates that were in the correct direction from one year to the next.

Whenever an appraisal of forecasts and estimates in major States and the United States for a significant number of crop and livestock items has been completed, the results will be made available in as intelligible form and widely circulated medium as possible.

DISCUSSION

CLIFFORD HILDRETH

I BELIEVE this paper is serving a useful purpose and I am glad to see the material presented. The principal suggestion I wish to make is that considerably more of such information is needed and should, I believe, be published regularly along with the various estimates that the Bureau of Agricultural Economics publishes.

In the early part of the paper it is pointed out that the production information services of the Department of Agriculture were initially undertaken to protect farmers from "false and misleading reports." Nothing further is said about the purposes served by such information. It seems to me that there are four principal groups vitally interested in the production information gathering services of the BAE. These are farmers, dealers and processors of agricultural products, action and legislative agencies of the government, and agricultural research workers. I am better acquainted with research workers than with the other groups so my suggestions are offered primarily with their needs in mind.

The worker who is basing research on production data always needs some indication of the reliability of the data. It would be a useful practice if these data were regularly accompanied by indications of reliability. If a particular estimate has been obtained by a sampling process, a standard error of estimate can be calculated. If a published estimate is based largely upon subjective judgments then a standard error in the usual statistical sense is ordinarily not possible. However, those persons who are able to exercise sound judgment in formulating an estimate should also have some judgments as to the reliability of the estimate and their judgments as to reliability would be of great help to the research worker. The Census Bureau has been furnishing estimated standard errors along with its estimates of various magnitudes for several years.

In addition to the data-gathering agency's own estimates of reliability the research worker should have ready access to a fairly complete description of the information gathering and estimation processes. This would serve two useful purposes—it would enable the research worker to form an independent judgment as to reliability of the data and it would enable him to offer suggestions for improvement in the processes.

To illustrate these notions I should like to mention several matters treated in the paper that I believe are of interest to research workers and on which I think the research worker needs considerably more information before he can form a judgment as to the desirability of the practices now being followed. This is not intended to mean that I believe the needed material should have been included in the present paper but is offered as a suggestion for supplementing the information given in the paper.

In comparing mail sampling to interview sampling the paper states that mail sampling is generally less expensive and yields results more quickly than interview sampling. I do not see why results cannot be obtained

[1] Morris H. Hansen and William N. Hurwitz, "The Problem of Non-Response in Sample Surveys." *Journal of the American Statistical Association*, v. 41, pp. 517–529.

quickly when speed is an important consideration and when this is taken into account in the design of the survey. There are instances in which interviewing surveys have yielded results very quickly. It is true that interviewing surveys generally cost more than mail surveys; however it is possible that some relevant items in the cost comparison are sometimes overlooked. In a mail survey part of the cost to the public does not appear as a BAE expenditure but is borne through the postal deficit. Also extended use of interview surveying would generally improve the reliability of survey results and this should make possible some reductions in the costs of non-survey estimation activities. It is probable, however, that these adjustments still leave interviewing as the more expensive survey technique. The extra cost must be balanced against the additional information that can be obtained from an interview as compared to a mail questionnaire and the increased reliability of the results of a well-conducted interview survey.

The technique that was called controlled mail sampling in the paper may be the preferred alternative in many cases. It has been developed from a sound theoretical base by Hansen and Hurwitz who have provided methods for estimation of magnitudes, methods for estimation of error, and the principles to be considered in designing an efficient survey.[1] I know of no comparable work for semi-controlled mail sampling and am somewhat more doubtful regarding its general value. In particular its use seems to depend upon making corrections from regression equations estimated from the sample. These regression estimates will ordinarily be subject to an unknown bias making it impossible to estimate the errors of the various "corrected" estimates of magnitudes.

Another process in which the research worker is interested and which he cannot evaluate without rather detailed information is the formation of Final Revised Estimates after Census data are available. These estimates will be used in any attempt to recover information from past history. The appropriate revision will depend on hypotheses held regarding the composition and relative size of errors in the unrevised estimates and in the Census data. For example, if it were held that errors in unrevised estimates were independent from year to year but were large relative to errors in Census data, the appropriate adjustment would be to substitute Census data for unrevised estimates for Census years and to leave unrevised estimates for other years unchanged. Other hypotheses would lead to other appropriate adjustments.

It was indicated that when regressions are used in making forecasts or estimates the regressions are obtained by a visual fitting process and it was pointed out that this permitted allowances to be made for changes in the relationship over time and permitted greater weights to be attached to more nearly comparable seasons. Both these things can, of course, be done with computed regression equations. If regressions are computed the investigator must make explicit his assumptions about changes in relationships and weights to be applied. This, I believe, is an advantage. Too often in visual fitting assumptions that affect the result are hidden, and appraisal and criticism of the work becomes very difficult.

The above topics are cited as examples of some concerning which the useful information given in the present paper needs to be supplemented.

ESTIMATES OF AGRICULTURAL EMPLOYMENT AND WAGE RATES*

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OUR aim in this paper shall be to review rather briefly the history of the two types of agricultural-employment estimates, to describe in some detail the new series of employment estimates which will probably be released in our January 1949 Farm Labor Report, and to discuss in rather general terms the problem of estimating wage rates.

Employment Statistics

There are two basic approaches to the problem of estimating the number of people working on farms, or in any other sort of establishment for that matter. The first, commonly known as the establishment approach, consists of obtaining information from proprietors in regard to the number of people working in their establishments during a specified reporting period. Either complete enumeration of all establishments can be made, as in Censuses of Agriculture, Manufactures, or Mining; or information can be obtained from a sample of establishments, as is done by the Bureau of Labor Statistics and the Bureau of Agricultural Economics. The second, known as the population approach, consists of obtaining information about the employment activity of individuals either from them or from members of their households. A complete enumeration can be made, as was done in the 1940 Census of Population; or information can be obtained from a sample of households, as is done by the Bureau of The Census for its Monthly Report on the Labor Force.

The Department of Agriculture has been obtaining crop information from farmers for more than 80 years. It was only natural, therefore, that when the Department wanted information on farm employment the establishment approach should be used. In October 1923, four questions on farm employment were added to the General Schedule which was sent to the township reporters. These questions, which were used through November 1925, asked for information regarding employment on the crop-reporter's farm, as

* Paper presented at joint meeting of American Statistical and American Farm Economic Associations, Cleveland, Ohio, December 29, 1948.

of the first of the current month and the first of the preceding month. In November 1923, for instance the questions read:

Farm Labor:
Number of persons working on this farm.
(Do not include household workers.)
(a) Family labor, including operator
No. on November 1 ———
No. on October 1 ———
(b) Hired help, including monthly, day, and piecework hands.
No. on November 1 ———
No. on October 1 ———

In December 1925, the two questions on employment as of the first of the preceding month were dropped and employment as of the first of the current month only was asked; the wording of the other questions remained unchanged. In January 1935, the wording of the questions was changed to correspond exactly with the wording used in the 1935 Census of Agriculture Schedule. The new questions read:

Farm labor—Persons employed. (See Note)
Number of persons working on this farm on or about January 1, 1935.
(Do not include persons doing housework.)
13. Family labor, include yourself and members of your family doing farm work without wages.
14. Hired help, include monthly, day, and piecework hands and members of your family paid wages by you.

The very long "note" referred to, which was probably read by very few crop reporters, introduced three new modifications. The first was that a person to be reported must have worked the equivalent of two or more days during a specified week. The second was that he or she must not have worked longer during that week at some other paid occupation. The third was that time spent doing housework, *not* people doing housework, was to be excluded. Although the schedule reads "Do not include persons doing housework," the note indicates that a housewife who, in addition to her housework and care of the children, worked the equivalent of two days during the week at farm work should be reported as unpaid family labor. A fourth change, or clarification in concept, which is accomplished in the wording of the questions themselves, is the exclusion of members of the family who are paid wages from the family-labor category and their inclusion in the hired-worker category.

There were difficulties in definition and interpretation of the questions which were not solved by the 1935 wording. Some of them have not yet been solved satisfactorily.

First of all, the definition of "farm work" was left entirely to the respondent and the application is therefore probably far from uniform. The housewife who not only cooks and cleans and sews but also churns, takes care of the chickens, and is responsible for the kitchen garden, provides the most puzzling problem.[1] Is her work in the garden and with the chickens farm work? How about the time spent in churning—is it farm work if the butter is for sale but housework if it is for home consumption? Must the wife actually work in the fields to be considered as doing farm work? Whatever decision the statistician may make regarding these questions, it is extremely difficult, in the limited space available on the General Schedule, effectively to explain to the reporter what should be considered farm work.

Second, what is the equivalent of two days? Is it ten, fifteen, eighteen, or twenty hours, or does it differ from region to region and from season to season?

Third, what is a farm? The Census, of course, considers each sharecropper's tract to be a separate farm. Relatively few sharecroppers serve as crop reporters, however, and there is a fairly general tendency for a plantation operator to consider all cropper tracts on his plantation as parts of his "farm" and all croppers and members of their families as family labor on his farm. Therefore, very large numbers of family workers are reported by a few plantations, and the presence or absence of a very few such reports makes a great deal of difference in the reported averages.

During the period from the inclusion of the farm-employment questions on the General Schedule in 1923, until January 1938, the Department of Agriculture did not attempt to convert the reported numbers of family workers and hired workers into absolute estimates for the United States and geographic regions. Instead, it published reported numbers of family workers, hired workers, and total workers per 100 farms.

Conversion to absolute estimates of numbers of workers on all farms in the United States was difficult for two reasons. First,

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[1] Experiment in the Measurement of Unpaid Family Labor in Agriculture, Ducoff, L. J., and Bancroft, G., *Jour. of the Amer. Statistical Ass.*, June 1945, pp. 205–213.

crop reporters and their farms are not representative of all farmers and all farms. Not only are crop-reporter farms likely to be larger and better equipped than average, but there is also a tendency for general crop and livestock farms to be over-represented, since most of the questions on the general schedule relate to field crops. Specialized growers of fruit, vegetables, and all sorts of specialties, are likely to be badly under-represented or not represented at all.

As a result of this lack of representativeness on the part of the sample, employment per reporting farm is generally at a higher level than employment per farm for all farms. When large numbers of croppers are at work during cotton chopping and cotton picking time the tendency of plantation operators to report all the croppers on the plantation exaggerates the average number per farm.

The seasonal pattern of employment is also somewhat different on reporting farms than on all farms. The reporting farms more often employ workers during the entire year and usually report smaller fluctuations in the number of hired farm workers than all farms would. For instance, dairy farms, which are probably adequately represented in our sample, have much more stable labor requirements throughout the year than do commercial potato farms or celery farms, neither of which are adequately represented.

Second, in addition to an unbiased estimate of number of workers per farm, it is necessary to have an estimate of the number of farms (in order to calculate the product of the two, which would be the total number of workers in the United States or smaller geographical area concerned.)

Shaw-Hopkins Estimating Methods

Personnel resources allocated to the labor project of the Department of Agriculture were not large enough to permit grappling adequately with these two problems of adjusting for bias in General Schedule indications and estimating currently the number of farms. In 1936, however, the National Research Project of the Works Progress Administration on Reemployment Opportunities and Recent Changes in Industrial Techniques undertook the analysis of all available information on farm employment and the preparation of a set of farm-employment estimates by type-of-farming areas for the years 1909–1936. The techniques and adjustment factors were developed in cooperation with technicians of the Department of Agriculture and they have been used with very little

modification ever since. Therefore, a rather thorough description of this estimating method, devised by Shaw and Hopkins in the course of the Research Project, is in order.[2]

The initial step was the preparation, by states, of curves representing the normal seasonal variation in total farm employment on all farms. Three different types of data were used in the derivation of these curves. First, information on labor requirements was obtained from farm management investigations. Second, the central 50 percent of the reports of crop reporters regarding the number of people working on their farms were summarized. Third, information on the employment pattern on so-called typical farms, as determined by farm-management and small-scale farm-employment investigations, was utilized.

Serious logical objections can be raised to all three of these types of information. First, it is obvious that labor requirements vary from season to season in a different way than does actual employment, for labor is not utilized equally at all times of the year. The composition of the farm-labor force also varies from season to season. Second, to discard the two tails of the distribution of number of persons reported working on crop-reporters' farms may increase the stability of the sample average but does little to increase its representativeness. Third, the "typical" farms for which employment data were available had not been chosen at random but had ordinarily been selected for purposes other than the use to which they were here put, and so they probably did not in the aggregate constitute a representative sample of farms. But whatever their shortcomings, the first and third types of information were probably the best available for constructing the curves of normal seasonal employment.

These curves were expressed in terms of each month's percentage of the annual total. The crop-reporter averages per farm of total, family, and hired workers were also expressed as percentages of the annual totals. As the normal seasonal curves had been developed to approximate seasonal changes in total farm employment, and as no independent information was available on the distribution of total employment between family and hired workers, the distribution between these two classes of workers on crop-reporter farms was assumed to be representative, and separate normal employment

[2] *Trends in Employment in Agriculture 1909–36*, Works Progress Administration, National Research Project, Report No. A–8, Nov. 1938.

curves were derived for family workers and for hired workers. This procedure was followed for each state, after which the ratios of the normal seasonal to the crop-reporter distributions were calculated separately for family and for hired workers.

These ratios represented adjustments which would alter the seasonal patterns of family workers and hired workers as reported by crop reporters to conform to the estimated normal pattern. But they would have left the per-farm averages far above the level for all farms as indicated by the data on occupations from the 1930 Census of Population and the farm-employment data from the 1935 Census of Agriculture. Therefore, the percentage downward adjustments that were necessary to lower the seasonal patterns of per-farm averages to the Census levels were calculated and then applied to the ratios of the normal to the reported distributions, month by month, separately for family and for hired employment. The resulting adjustment factors, when applied to the reported average numbers of family and hired workers per farm, reduced the averages to the Census level and adjusted the seasonal variation to that estimated to be normal. When these adjusted per-farm averages were multiplied by the Census number of farms, they yielded absolute estimates of the numbers of family workers and hired workers who would have been enumerated had a complete census been taken every month during a census year rather than only once during the year.

Such factors were calculated for the census years 1930 and 1935 and interpolated for intervening years. Numbers of farms were also interpolated, so that monthly and annual estimates could be prepared for non-census as well as for census years. The 1935 adjustment factors and the Census number of farms were carried forward until 1940 Census data became available, at which time new adjustment factors were calculated. Interpolations of both the adjustment factors and the numbers of farms were made for the 1935–40 period, and the 1940 adjustment factors and number of farms were carried forward until the present time.

The estimates resulting from these calculations have represented all family workers and hired workers who worked two days or more during the reporting week on farms whose operators did not do 250 days or more work per year off their farms. Such arbitrarily defined part-time farms were deducted from the Census reported numbers and the estimated numbers of farms. Employment on

part-time farms, both family labor and hired, was at least theoretically excluded from the employment estimates. As operators of only a very few such part-time farms are among our crop reporters, employment on such farms is included only to a very limited extent in our crop-reporter indications.

There are several logical objections to these procedures, ingenious as they were. In the first place, as a bench-mark was available for only one date, the seasonality of the adjustment factors contained a very large subjective element. In the second place, the continued use of the same adjustment factors from year to year presupposed no change whatever in the direction and extent of bias in the crop-reporter indications. Third, carrying forward from year to year the number of farms which had been established for the preceding census year disregarded the fact that, although no accurate information might be available on the number of farms at annual intervals, the number was changing. What was obviously needed was more frequent unbiased employment information at different seasons of the year. But the Department had little or no money to spend on employment estimates, so further development in that direction was long delayed.

Labor-force Concept Developed

During the depression and recovery of the 1930's, a development took place outside the field of agricultural statistics which was to result in a new and independent series of farm-employment estimates. The acute administrative need for statistics on unemployment during the depression focused national attention on certain deficiencies of the gainful-worker concept that had been used repeatedly in the Census of Population.[3] Young people hunting for their first job, persons who were working on the reporting date but were not usually employed, and former workers who had retired because of age or disability, represented difficult enumerative problems so long as the basis for classification was the "occupation" of the individual rather than his employment status during a specified period.

The first major attempt to shift over to a classification of individuals based on current employment status occurred in Michigan

[3] *Labor Force Definition and Measurement*, Social Science Research Council, Bul. 56, 1947, Appendix A, *Development of the Labor Force Concept*, John D. Durand.

in 1935.[4] This was followed by a Works Progress Administration sample Census of Partial Employment, Unemployment, and Occupations, in November 1937.[5] Here for the first time a "sorter" question was used to divide the population of working age into two major groups, those working for pay or profit during the survey week and those not working. One set of questions was asked of those working; another set was asked of those not working. Other sorter questions further divided each major group, and each individual could ultimately fall into one and only one category. This technique worked so well and the labor-force concept was so generally accepted that in the 1940 Census of Population a shift was made to the labor-force concept. In the 1940 Census, as in all later surveys of the labor force, the reporting period has been a specified week. This period is long enough to be relatively unaffected by the Sundays, holidays, and other rest days that make employment as of a given day rather unstable. On the other hand, activity during the preceding week is much easier to remember than activity during the preceding month, and employment status is much less likely to change during the shorter period.

Beginning in March 1940, the Bureau of the Census[6] has conducted a monthly survey of a sample of households, the purpose of which is properly to classify all individuals 14 years old and over as, (1) at work on a private or governmental job, (2) having a job but not at work, (3) not at work but actively seeking work, (4) not at work and not seeking work because of indefinite lay-off, or lay-off lasting more than 30 days, temporary illness, or the belief that no work is available in the community or in the individual's line of work, or (5) not at work and not looking for work for other reasons. The first two categories are considered to be employed, the next two categories are classified as unemployed, and the last group is by definition excluded from the labor force. The two categories of employed persons, at work and with a job but not at work, are divided between agriculture on one hand and non-agricultural industries on the other. Those at work in agriculture are further

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[4] *Michigan Census of Population and Unemployment, Employment and Unemployment Statistics, First Series 1935*, Mich. State Emergency Welfare Relief Commission.

[5] *Census of Unemployment: 1937—Final Report Vol. IV—The Enumerative Check Census.*

[6] *Labor Force Definition and Measurement*, Ducoff, L. J. Hagood, M. J., social Science Research Council, Bul. 56, 1947, pp. 9–10.

classified by sex, by hours worked during the week, by age, and by class of worker—as self-employed, unpaid family, and hired.

The techniques of selecting the households to be included in the sample and expanding the indications into national estimates have been covered adequately elsewhere[7] and are not discussed here. A continuous effort is made to detect biases in the indications and to devise procedures for avoiding or correcting for bias.

The sample was designed to furnish only national estimates of employment and unemployment. It contains only 68 sample areas, so state estimates cannot be made from the sample indications. For the United States as a whole, however, the estimates of number of working farm operators, unpaid family workers, and hired farm workers, are widely accepted. The only outside types of information needed for their preparation are (1) the Census data used in designing the sample and (2) independent population estimates, by age and sex groups, which are used to "true-up" the sample indications. Furthermore, the MRLF agricultural-employment estimates possess the great virtue of fitting into a larger complex of labor-force and population estimates, derived from the same source and in the same way. Agricultural employment plus non-agricultural employment equals total employment. By definition, number of persons employed plus number of persons unemployed equals civilian labor force. Civilian labor force plus number of persons in the armed forces equals total labor force. Total labor force plus persons not in the labor force equals total non-institutional population. All of these categories include only persons 14 years old or over.

The estimates of agricultural employment published in the Monthly Report on the Labor Force differ materially from those prepared by the Bureau of Agricultural Economics by the Shaw-Hopkins method. The differences are due primarily to differences in concept. In the MRLF estimates, each person is assigned to only one classification; in the original BAE series persons working the specified minimum time were excluded if they worked more time outside agriculture. But the increase during the war in the proportion of the farm population having non-agricultural jobs has meant that the old adjustment factors do not eliminate all such persons from the estimates, if these persons did the required minimum

[7] *The Labor Force Bulletin, No. 5*, Nov. 1945, Bureau of the Census.

farm work and were so reported. Furthermore, a person who works two or more days on two or more farms during the reporting week may be reported two or three times. Another difference between the two series results from the inclusion in the BAE estimates of varying numbers of children who are less than 14 years of age, all of whom are, of course, excluded from the MRLF estimates. A third source of discrepancy arises from the fact that whereas, on the MRLF schedule, employment is a matter of hours worked, on the General Crop Schedule the question is phrased as "the number of persons working two or more days" an expression which is susceptible of a wide range of interpretations. A fourth difference is found in the fact that persons with normally non-agricultural occupations (such as bookkeepers, typists, nurses, and airplane pilots), who are working on farms are excluded from the BAE series but are included in the MRLF estimates.

Despite the usefulness of the MRLF series, based on population surveys, in the field of labor-force analysis, there are many uses to which they cannot be put. More geographical detail is needed than they provide; specifically, hired-employment weights are needed for combining wage and wage-rate data into state, regional, and United States averages and indexes. Relationships between employment and size of farm, type of farm, income, and wage costs, are needed by farm-management workers. Early in the war rather detailed information on employment and wages in local areas and specific labor-intensive crops was needed upon which to base administrative action to prevent any curtailment of necessary food and industrial crop production because of inadequate labor supplies. As a result, in the winter and spring of 1942 the Bureau of Agricultural Economics made several employment and wage surveys by the interview method in labor-intensive areas, and four large mail surveys using a special list. From April through June of 1942, state estimates of farm employment were published; but at the end of the 1942 fiscal year the funds were curtailed, the large list was abandoned, and sole reliance in the preparation of regional estimates was placed on the General Crop Schedule indications, as before.

Recent Surveys Basis of New Definitions

As more and more persons left the farm for the armed forces and war industry, the farm-labor market tightened. By early 1945 the Bureau of Agricultural Economics, again having funds available,

launched a series of employment and wage surveys by interviews, using an area sample. These surveys, like the MRLF, were based on pioneering work done by the Works Progress Administration; but unlike the MRLF they were establishment rather than household surveys.

The primary purpose for which the enabling funds were appropriated was a study of the wage structure, but it is of course impossible to collect information on wages without also collecting information on at least hired employment, and in practice it is simpler to collect information on family employment at the same time. This was done in the March 1945 survey. The definition of two or more days of work for farm operators and unpaid family workers was followed; but information was collected regarding employment and wages for all farm workers who worked during the week for pay, even if the time spent was only an hour. The same definitions were used in a survey in May 1945. But in September 1945, information was obtained on the actual number of hours worked by the farm operator, the number of unpaid family workers working from one to 14 hours, and the number of unpaid family workers working 15 hours or more. The same questions were asked again in a similar interview survey in July 1946.

Each of these farm surveys covered approximately 20,000 farms in approximately 160 counties, and hired-employment expansions were made for four broad regions as well as for the United States as a whole. The sample used was designed specifically for efficiency in sampling hired farm employment.

In January 1947, and in April 1948, a general-purpose sample of 18,000 and 12,000 farms respectively located in about 800 counties was surveyed by interviewers. Among the subjects carried on the schedules were family employment and hired employment, wage rates, and wages. Information on the actual number of hours worked was sought in regard to all these groups of farm workers, so that any desired breakdown could be made. Similar information was obtained in an interview survey of 10,000 farms in 400 counties, taken in September 1948.

As originally published in the series "Wages and Wage Rates of Hired Farm Workers," the expanded indications from the interview surveys represented other concepts of farm employment than are used in the published series, and no attempt was made to harmonize them.

However, with rather reliable sample materials available for five

different seasons of the year from the interview surveys—that is, for January 1947, March 1945, May 1945, July 1946, and September 1945—the necessary factual basis for a rather thorough overhauling of the published series of estimates appeared possible and desirable. Ideally, interview surveys should be made at frequent intervals, much as is done by the Census in its MRLF surveys except that the establishment rather than the population approach would be used. However, as funds are not in prospect for frequent surveys of this type, it has seemed desirable, to redefine farm employment and to utilize the interview-survey data for the development of new adjustment factors, with a much smaller subjective element. The new definitions and concepts are as follows:

(1) Estimates of farm employment will include employment on all farms that meet the Census definition, irrespective of the time which the operator spends working elsewhere.

(2) The following persons will be counted as working during the survey week:

(a) All operators who do any work at all,
(b) All hired workers who work one hour or more for pay,
(c) All unpaid family workers who work 15 hours or more.

These new definitions correspond much more closely than did the old ones to those currently used by the Census in its Monthly Report on the Labor Force. In fact, so far as persons 14 years old and over are concerned, there are only three differences: First, a person classified as a farm operator, unpaid family worker, or hired worker on the basis of an establishment report would be classified otherwise by the MRLF if he or she spent more hours during the survey week at some other gainful occupation; second, a farmer or a hired farm worker who doesn't do any work at all during the survey week because of illness, vacation, or weather, would not be counted as employed in our BAE estimates but would be called "employed but not at work" by the MRLF; third, persons with non-agricultural occupations but working for agricultural establishments would be included in the MRLF estimates but excluded from the BAE estimates.

Employment estimates under the new concept for both family workers and hired workers have been prepared for the 1940-48 period. They will probably be released early next year. We plan

that the current estimates from January 1949 on, will be on the basis of the new concepts. The steps involved in the preparation of these revised estimates were as follows:

First, the number of farms in each state was estimated for each year through 1947 on the basis of Census data, on information from several sources on the total acreage of land in farms, and on survey indications of average farm size. These estimates of numbers of farms provided the base to which adjusted numbers of family workers and hired workers per farm could be applied to yield absolute estimates of farm employment. The adjustment factors themselves were derived by a process which, in over-simplified terms, was something like this:

First, tentative absolute estimates of family and hired workers were set for each region and state for each of the five weeks covered by the already-summarized interview surveys. Second, as none of the survey weeks coincided exactly with the weeks for which employment had been reported on the General Crop schedule, interpolations for the interview-survey weeks were made between the crop-reporter indications for the two adjoining months. Third, absolute estimates for roughly corresponding months in 1944 were made by calculating the ratio of the reported numbers of workers per farm, in the 1944 months, to the interpolated reported numbers per farm for the survey weeks and then multiplying the estimates for the survey weeks by these ratios. Fourth, data on labor requirements for the year 1944 were adjusted for the varying length of farm work days throughout the year, and the resulting modified requirements were used as a basis for interpolating tentative estimates for the other seven months of 1944. Fifth, some state estimates were adjusted to bring them into agreement with the tentatively adopted regional estimates. Sixth, estimated numbers of workers per farm, family workers and hired workers separately, for each of the months of 1944 were calculated by states and regions by dividing the employment estimates by the estimated numbers of farms based primarily on the 1945 Census of Agriculture. Seventh, regional-adjustment factors for each of the 12 months of 1944 were calculated by dividing the estimated numbers of workers per farm by the numbers reported on the General Schedule. Eighth, state adjustment factors were calculated by averaging the 1943, 1944, and 1945 per-farm indications from the General Schedule and dividing the resulting averages into the estimated per-farm

number of workers. The 1943–45 average indications were used instead of the 1944 indications alone because of the instability of some state samples.

The 1944 adjustment factors were applied to crop-reporter indications by months, from January 1940 on (using the new estimates of number of farms) in the calculation of revised estimates of family and hired employment for the years 1940 through 1948.

It was of course desirable to shift the wording of the employment questions on the General Schedules from the old concept (working two or more days) to the new (working operators, working hired workers, and family workers working 15 hours or more). In order to make this change without a break in the indications, the General Schedule lists in all but a few of the smallest states were split in January 1948. Throughout 1948, half the lists continued to receive schedules containing the old questions, while the other half received questions based on the new wording. On the July 1948 General Schedule, for instance the new questions asked outside the South read as follows:

> Farm work, including chores, on your farm during week of June 20–26.
> Operator:
> On how many different days during the week of June 20–26 did you do farm work or chores on your farm, or transact farm business? ——— Days.
> Other persons working on this farm:
> How many other members of your family worked 15 hours or more on your farm, excluding housework, during the week of June 20–26 without receiving cash wages? ——— Number.
> How many other people worked one hour or more for pay on your farm during the week of June 20–26? (Include family members receiving cash wages.) ——— Number.

In the South, the questions regarding the operator and unpaid family workers were the same as in the North, except that the words "or plantation" were added after "farm" wherever location was specified. The hired-worker question was slightly changed by the enlargement of the parenthetical expression to read "(Include family members, croppers, and members of their families receiving cash wages.)" A new question was added to read as follows:

> How many croppers and members of their families worked one hour or more on this plantation during the week of June 20–26 without receiving cash wages? (Do not include any persons already reported as working for pay.) ——— Number.

By comparing per-farm indications obtained from the old and from the new questions in the same state, it was possible to derive conversion factors which have been used to convert the 1944 adjustment factors for use with the indications from the new questions. From January 1949 on, only the new questions will be asked of the entire list in all states. Croppers and members of their families who are working without wages will be included with working operators and unpaid family workers to get indications of total family workers.

Although the new concepts are more precise and the new questions are more explicit than the old, and although the new adjustment factors are based on more objective information than were the old, estimates based on current crop-reporter indications should be "trued up" at rather frequent intervals by independent expansions from interview sample surveys. Unless this is done, the adjustment factors may become obsolete and the estimates may contain progressively larger errors. Likewise, current estimates of numbers of farms, based as they are on fragmentary and indirect indications may contain increasing errors, as the most recent Census is left further and further behind. Interview surveys furnish a check on estimated farm numbers at the regional and national levels. Ideally, we should like to make an interview survey every three months, but apparently we shall have to be content with the lesser accuracy achievable with semi-annual or annual surveys varying the dates from year to year to permit appraisal of the adjustment factors for the different calendar months.

Wage Statistics

Wage statistics in agriculture in the United States date back to 1866. In that year the Department of Agriculture made its first survey of average wage rates paid to hired farm workers. Mail questionnaires addressed to its crop correspondents were used. A second survey, covering the calendar year, was made in December 1869. The third inquiry was made in May 1875. All succeeding surveys until 1892 were made in the spring. When the surveys were made in the spring, the year to which the data apply is uncertain and is published as of "1874 or 1875." From 1892 to 1908, surveys were made in the autumn or winter.

These early wage-rate surveys were not made every year nor at regular intervals. There were 19 surveys in the period 1866 through

1908. Annual surveys were made from 1918 to 1923, while from 1923 to date wage-rate information has been collected quarterly, on January 1, April 1, July 1, and October 1.

The records of wage rates per day are comparable from 1866 to 1923; during this period they were designated as for "other than harvest work." Monthly wage rates are not completely comparable. From 1866 to 1890, monthly rates were for workers hired for the year. The record from 1892 on shows no such distinction. The series on daily rates from 1923 to the present date have been for rates paid at the "present time." The rates from 1923 to date are more nearly comparable to the earlier annual rates for "other than harvest work" than to rates "for harvest work," or any combination of the two types of rates.

The series of wage rates back to 1866 have been for four types of rates: Per month with board; per month without board; per day with board; and per day without board, by states. Index numbers have also been computed on a 1910–14 base. Since 1923, when the quarterly series was started, the wage-rate questions on the General Crop Schedule have read as follows:

Wage rates (average rates being paid to hired farm labor at the present time in your locality).

1. By the month with board
2. By the month without board
3. By the day with board (including average daily earnings of piece-workers)
4. By the day without board (including average daily earnings of piece-workers)

Weighting individual state wage rates to obtain averages involves three processes. The first is the combination of state wage rates to obtain geographic region estimates and U.S. estimates. The second involves combining the different types of wage rates into a wage-rate index. The third is the calculation of annual average rates from quarterly rates.

Numbers of hired farm workers are used as weights in calculating U.S. and geographic region estimates from State data. Employment data from the Census of Occupations were used from 1866 to 1908; and from 1909 to 1922 employment data from the 1910 and 1920 Censuses of Agriculture were used. Since 1923, monthly employment data collected by BAE have been used for weights. The series was reweighted in 1938 by the new estimates of hired

employment released at that time. For the period before 1938, average hired employment for three months was used for weighting; the current estimates since then have been weighted by hired employment for the current month.

In combining different types of wage rates into a monthly composite, estimated numbers of workers receiving each type of rate are used. These estimates are based on percentage distributions of workers by geographic regions derived from a survey made in 1927. Daily rates are converted to a monthly basis by multiplying by 20—a factor which was chosen because it gave approximately the same monthly rate as that reported, and appeared to be a reasonable approximation of the days a hired hand would work.

The third type of weighting is that required to prepare annual averages. Since the data on wage rates and employment are for the first of the month, it was necessary to weight the wage rates to center on July 1, the center of the calendar year. To do this, January current rates are weighted by ½ of January employment plus February's; April rates are weighted by March, April, and May employment; and so on through October. Wage rates for January 1 of the following year are weighted by employment for December and half of January of the following year.

Criticisms of Farm-Wage Rate Series

The BAE series of farm-wage rates is open to several criticisms. The absolute level of wage rates is one of the first points to be questioned because of the type of question asked. As farmers are asked to report average wage rates for the community with which they are familiar, the reported averages depend upon the ability of the respondent to appraise the relative importance of wage rates other than the "going" rate. There is some evidence that reported rates may be more nearly rates for able-bodied men than average rates for all hired workers. The year-to-year change, however, is probably more nearly representative than the actual level of wage rates.

Another criticism of the current wage-rate series is that they do not cover all types of wage rates. Coverage of wage rates varies widely from season to season and from region to region. The most complete coverage of all wage rates is obtained in the winter months in the North and South Central and the Mountain States, when from 60 to 80 percent of workers are paid the types of rates which are currently reported. Coverage declines in all regions during the

harvest season, when piece-work rates are most important. Rates for piece-work are supposed to be converted to daily earnings and entered in the daily-rate average by the respondent, but it is doubtful that this is often done. Recent experience with interview surveys indicates that it is usually difficult to get data on piece-workers directly from the operators who are employing them even when the operators have fairly accurate cost accounts, It is therefore practically impossible for a respondent to convert piece-work rates into earnings for a community with a high degree of accuracy.

Terminology used on the current wage-rate questions is indefinite. The terms "with board" and "without board" are not specifically defined and may be interpreted in different ways by different respondents. The "without board" category of rates is probably a mixture of rates for persons receiving a house and those receiving no major perquisites. When the present questions regarding wage rates were set up the questions undoubtedly fitted the practices then in effect. The "with and without board" questions separated the workers paid only cash wages from those who were receiving major perquisites in addition to cash wages. Hiring practices have become much more varied, however, so the questions that were once suitable have become antiquated.

Recent Wage-Rate Series Changes

The wage-rate program of the BAE proceeded for many years with little change. During the war, more interest began to be directed toward farm labor because of the manpower situation and the imposition of wage ceilings. A program to collect wage data for individual workers was started in 1942 but came to an early end the same year. More significant results were achieved from the enlarged wage program, initiated in 1945.

This program was divided into two parts. The first part consisted of interview surveys regarding wages and wage rates of hired farm workers in small areas, with a high concentration of specialty crops. Seventy-five areas were covered in 1945 and one area in 1946. Data for most of the areas were collected from a sample of farms, but in a few cases samples of workers in labor-supply centers were used. Results of these surveys were published in the BAE series "Surveys of Wages and Wage Rates in Agriculture."

The second phase of the program consisted of nation-wide interview surveys of a pre-selected sample of farms to obtain detailed

farm wage and employment data for the nation and four major geographic regions. Results of these surveys are being published in the series called "Surveys of Wages and Wage Rates in Agriculture." General reports have been published for the surveys of March, May, and September 1945, July 1946, and January 1947. Surveys of April and September 1948 are now being processed.

Interview surveys have been used to collect such information about individual workers as farm and worker characteristics, wage rates, time worked, weekly earnings, perquisites received, and type of worker. Data on value of perquisites were obtained in the survey of May 1945.

A program of interview surveys at quarterly intervals has not yet been made a permanent part of the BAE program. Consequently, extensive overhauling of the wage-rate program, which depends on mailed questionnaries is underway. An attempt is being made to bring the wage-rate series into better agreement with current practices as revealed by interview surveys.

The first step in this program of revisions has been the establishment of a new set of wage rates by types. A group of nine types of wage rates will be used for the new series. Not all types of rates will be asked in every state, but only the rates of major importance in each geographic region. The number of rates will vary by regions from four to six, with six rates asked for in only one region. The types of rates are as follows.

Per month with board and room
Per month with house (no meals)
Per week with board and room
Per week without board or room
Per day with board and room
Per day with house (no meals)
Per day without board or room
Per hour with house (no meals)
Per hour without board or room

Piece-work rates are not being asked because experience has shown that it would be practically impossible for a respondent to estimate earnings of piece-rate workers with any reasonable degree of accuracy. But earnings of piece-rate workers approximate fairly closely the rates per hour without board or room.

The first step toward the use of new wage-rate questions was taken in January 1948. At that time the general crop-reporter mailing list was split into two parts. One part received question-

naires with the old questions and the second part received questionnaires with the new questions. This was continued for each of the quarterly wage-rate questionnaires. In a few states where the sample was very small, only the old questions were used. Beginning with January 1949, only the new questions will be used in all states. The device of splitting our mailing list and using both new and old questions during the four quarters of 1948 makes possible the splicing of the wage-rate index.

Weights for combining wage rates and conversion factors to change all rates to hourly equivalents have been set up for each quarter on the basis of the data from the interview surveys. These weights were required for each quarter because of the variation from season to season in the percentage of workers paid different rates. Per hour rates without board or room will be weighted by the percentage of workers receiving piece-rates as well as by the percentage of those receiving the per hour rate. The weights for rates of relatively little importance will be added to those for the most similar rates asked.

Another part of the project of revising the wage rates will be the reweighting of the quarterly wage-rate series. The old 1927 weights, in addition to being badly out-of-date, are based on an annual average. New weights will vary from quarter to quarter. Although considerable subjective adjustment of weights may be necessary at first, the quarterly weights should more nearly represent actual payment practice than the constant set of weights now used.

The new set of wage rates is not expected to be completely devoid of all the shortcomings of the old series, for they will be based on the answers to locality questions rather than on answers to individual farm questions. It is expected, however, that the new wage-rate series will be an improvement over the old, and give a more realistic picture of the actual wage-rate situation. They are not based on the type of information which would be collected on an unlimited budget, but they represent a practical compromise.

THE SOCIAL SCIENCES IN EXPERIMENT STATION RESEARCH*

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MORE than sixty years ago the Federal Government began to provide for American agriculture research facilities that it could not provide for itself. During the early years these federal contributions to the experiment stations and the Department of Agriculture were not consciously designed to overcome a handicap on the part of farmers in comparison to industrial enterprises. Many industrial concerns were not then in corporate form, and few of them had research laboratories. But research had been going on informally for a long time, both in agriculture and in industry. We need only to think back to the time of Jethro Tull, of Arthur Young and of Robert Bakewell to realize that farmers of inquiring mind had long been experimenting and observing relationships with a view to increasing productivity, reducing costs, and husbanding soils.

Industrial experimentation in these earlier years was mostly individual and mostly mechanical. Some stimulus, which we need not trouble to identify, brought a remarkable upsurge of inventiveness in the English-speaking world during the decades before and after 1800. Many of the inventions developed in the United States had to do with farm operations, but the change was by no means confined to agriculture. Both in industry and in agriculture the emphasis was on mechanical research; how to do the same things faster and with less labor. There was little concern with quality improvement or development of new products. This was a logical emphasis. The new country was short of labor and short of goods of the customary kinds.

Machines could be invented, built, and tried out by individuals, and the process required little in the way of special training or facilities. It was not until chemical, biological and physical investigations came into prominence that research organizations began to be set up. Those in agriculture were among the first, but industry, under private financing, soon outstripped agriculture in the pro-

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vision for formal research. In recent times the great chemical companies, the oil companies, the meat packers, the electrical equipment manufactures and the makers of airplanes spend tens of millions on research each year. The feeling has grown that agriculture, with its small segment form of organization, must have its public support greatly increased if it is to make progress in keeping with that of industry which can finance huge research projects privately because of its corporate form of organization.

All this is familiar ground to you. My reason for bringing it up is to examine more closely and in greater perspective some of the conclusions we are prone to draw when viewing these problems at short range and in small segments.

Social Science Approach Not New

Until the social sciences came into prominence in the 1920's it was generally assumed that research in agriculture had always been pretty much confined to its physical and biological aspects. In broader perspective this is not true. The Physiocrats of eighteenth century France engaged in extensive speculation about the place of the extractive industries in the economy, and worked out a theoretical framework in which these industries were given first place as the fundamental producers, the appropriate sources of taxes, and so on. Around 1800 British students began to examine agriculture in ways that were more in keeping with the methods of modern science, and which laid the foundations for the modern sciences of economics and sociology. Ricardo developed, from his observations in agriculture and the study of earlier writers, the first careful formulation of the laws of rent, and also a theory of wages. Malthus, likewise with an eye on agriculture, formulated a body of doctrine concerning the relation of population to food supply that attracted much attention in the setting that then existed, and which now is again receiving attention from scientists all over the world.[1] Forty or fifty years later, John Stuart Mill began to concern himself with the social structure of agriculture, and did pioneer work in what we would now call rural sociology.

The point I wish to make is that the social science approach to agricultural problems is not something new and without precedent.

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[1] The layman is likewise beginning to come to grips with this fundamental problem of a vastly increased rate of population growth in relation to a much slower increase in food production.

Fundamental, and in some measure scientific, study of agricultural problems reached a high level in the social sciences during this early period, particularly in the work of Ricardo and Malthus. The thinking of these students was, however, so broadly applicable as to cause their followers to turn more and more toward study of commercial and industrial economics. The result was that social science studies of agriculture virtually disappeared for nearly half a century.

It was during this last half of the nineteenth century, when the social scientists were concerning themselves mainly with industrial and commercial phenomena, that the agricultural experiment stations were established. They very properly began work on the vast array of problems close to the farmer; studies in crop improvement, animal breeding, soils and fertility and so on. In these early years techniques were little developed, scientifically trained workers were few, and the problems were relatively simple. Much experimenting needed to be done, and first approximations of considerable significance could be achieved with relatively crude methods. The new field of research was fortunate in drawing to it at an early stage a number of men of considerable stature; such men as Bailey, Hilgard, Henry, Davenport, and later Russell and Hunt. They were able to identify important areas for study, to select able men; and, as a result, set a pattern of research that has been enormously productive. Out of it has grown much significant work, some of which, like the work of the early economists, has contributed to interests wider than those of agriculture. The modern science of human nutrition owes much of its original impetus to researchers in the agricultural experiment stations, and important contributions have been made in pathology and entomology.

The very success of these early developments in the natural science aspects of agriculture led to preoccupation with them to the exclusion of most other types of study. But it would be a mistake to assume that there were no social science problems in this period, or that farmers were not concerned about them. Through the 1870's and 1880's the farmers were taking the lead in bringing about orderly control of railroad rates and financing; they were experimenting with new methods of marketing; they were intensely interested in monetary policy as evidenced by their vigorous espousal of the greenback and free silver movements. They were likewise concerned with sociological and cultural problems as

shown by their quick response to the Grange program, and the efforts of the Farmers' Alliance and other organizations to foster educational and social activities. But the social sciences were not equipped to serve them, and rather generally the farmers looked to political action and political leaders for solutions to these problems.

Social Science Research Handicapped

Why, then, in view of their early leadership in the field of agricultural research were the social sciences so backward and impotent? The reasons are varied and rather complex. I shall not try to list all of them. Statistical research, which many regard as the "scientific" approach in the social sciences requires large bodies of data and refined methods of statistical analysis. Since given variables or controls cannot be held constant, as in many natural science investigations, the data must be comprehensive enough to permit use of such methods as those of partial and multiple correlation; in other words, to make it possible to measure, and allow for, the effect of a variable that cannot be controlled.

At that time the basic data for such studies were not available, nor were the statistical techniques. Both of these are, in the main, developments of this century. The United States census was put on a more scientific basis in 1880, and it began to be possible to study such things as farm tenure, population changes in agriculture, values of farm lands, and so on, though significant studies could not be made until such data had accumulated for several decades. The Department of Agriculture was accumulating useable data on crop acreages, yields, numbers of livestock, market movements, etc. Orderly series of price data were becoming more available, and such agencies as the Interstate Commerce Commission, the Bureau of Corporations, and the Comptroller of the Currency were beginning to require more adequate duplication of data about corporations and other businesses.

I do not want to leave the impression, however, that the statistical approach is the only scientific one in studying social science phenomena. The basic purpose of research is to increase understanding of our environment, both physical and social. We normally combine with that a second step which goes beyond research; namely, an attempt to use that understanding in devising practical solutions to our problems. But unless we have first achieved a sound understanding of the processes themselves the "solutions"

are likely to prove faulty and sometimes even harmful. The social sciences use numerous techniques, of which statistical analysis is only one. For example, the case method, in some fields the experimental approach, and in still others the construction and analysis of "synthetic" models. Qualitative analyses often are of the greatest importance, especially in the early stages of research or in respect to relationships that do not lend themselves to quantification. But almost all of these methods require techniques and sources of general information that were relatively unavailable prior to 1900.

Lacking such resources the economists turned more to the philosophical rather than the quantitative approach. It was by no means, however, a period devoid of inductive investigation. Nevertheless the economists of that period were not in a position to give farmers, legislators, and businessmen solid studies on the effects of tariffs, monetary measures, freight rates, and marketing practices.

Farmer interest in economic and social problems, as farmers, was relatively quiescent in the period of rising prosperity that extended from 1900 to 1920. But the depression of the 1920's, and even more so that of the 1930's, revived and intensified farmer interest in the economic aspects of agriculture. A new and complex set of problems had arisen. These did not lend themselves to simple political slogans such as the issuance of more greenbacks, free coinage of silver, or the control of railroad rates. Farmers wanted more information; primarily information relative to prices, marketing efficiency, methods of social control and so on.

The Congress reflected this interest by passing the Purnell Act of 1925, and again through the Bankhead-Jones Act of 1935. More recently it has thrown the balance heavily in the direction of marketing research in the Act of 1946. Collaterally it sought, through provision of the regional research laboratories, to achieve for agriculture some of the kinds of gain that industrial corporations and processing agencies had obtained through scientific research. This emphasis became apparent not alone in the regional laboratories but in the experiment stations and the Department of Agriculture as well.

But the results flowing from these new legislative emphases were not wholly satisfying. The social sciences, to be sure, were coming back into the limelight in the agricultural realm, but in a new form, and with almost no contact with the earlier develop-

ments in agricultural economics. It was not economists who led the way, but rather agronomists such as Warren, Spillman, Handschin and Boss. They began to study the economics of the individual farm, not that of the agricultural industry. Their approach was narrowly occupational, and little concerned with the broad interests of society as a whole. They studied farm management, marketing, credit, and tenancy, and later price analysis. But many of these early studies were crude and scientifically unsound, just as many of the early natural science researches were crude and scientifically unsound. But a more adequate attack on the social science aspects of agriculture was taking shape. Notable progress was made in the 1920's; in the refinement of data, in methods of analysis, and in the training of personnel; and there was coming into being a clearer perception of the kinds of problems needing study.

Financial resources were not shifted in the direction of social science studies as fast as farmers or the Congress desired, nor as much as the language of the legislative acts implied. Research in the natural sciences was more mature and probably more productive than that in the social sciences. Most station directors were natural scientists, aware of the problems of natural science research, in sympathy with its methods, and at home in its language. Few of them understood the social sciences well enough to know what was good research and what was not, or why these methods so foreign to their experience and apparently so lacking in scientific precision were necessary. The station programs remained heavily oriented to natural science research, and probably wisely so. The need for more social science research existed, but the social scientists probably were not equipped to use effectively more funds than they got. Some of the funds assigned were not used effectively or on significant problems. While perhaps more apparent in the social sciences, that defect has not always been absent in natural science researches either.

The great depression of the 1930's and the programs associated with it brought a new situation. Real research in the social sciences almost disappeared. Nearly every social scientist who was trained or semi-trained, and many who were not trained at all, was catapulted into the operational activities of a vast and somewhat chaotic social experiment, much of which was on a trial and error basis. In more mature form and with better defined objectives, this was continued through World War II.

We have seen that the Congress and the farmers have been crowding the experiment stations in the direction of more research in the social sciences. In the Acts of 1925 and 1935, and even more vigorously but much more narrowly in that of 1946, the legislators have been saying, "We want solutions to our economic and social problems." Somewhat glibly they have often said, "We don't want the kind of research that shows us how to make two blades of grass grow where one grew before. We want to know how to sell our products for more money."

But when they come right to grips with their real problems, that is not the bent their interest takes. Basically they are wiser than their slogans would indicate. They want help on their own individual problems and many of these are technological production problems. The State of California has for the past two years had an officially established agricultural research study committee made up of agricultural leaders from over the state. Its function is to indicate to the Governor and the University of California the problems these farm leaders think should be given study. Their 122-page report for 1947 contains a fair sprinkling of economic projects, but page after page of it consists of recommendations for research on technological problems. On the other hand one cannot read the early reports of some of the national research advisory committees without feeling that they either have not recognized or have shied away from some of the broader problems that they should have considered, and have confined themselves too exclusively to somewhat minor technological problems.

Selection of Significant Problems Important

But this does not mean that the farmer is not conerned over problems in the social science fields. He is deeply aware of them, but he doesn't know how to state or formulate them. It is easy to see the problem created by mildew on a grapevine or the effects of rust on a field of wheat, but a vastly different thing to understand the nature of a sudden contraction of credit or purchasing power or international trade as it affects the prices of the things the farmer sells. Here more professional help will be necessary in selecting significant fields of research. Except as the efforts in this direction are wisely chosen and competently executed, the wastage of funds will be enormous.

One reason for this lies in a fundamental difference between social science research and natural science research, a difference

that needs to be recognized but not overemphasized. In many of the natural science researches a given relationship can be reproduced ad infinitum by reproducing the given set of conditions.[2] Hence much time and effort can properly be used in determining very accurately and bit by bit a whole series of relationships leading up to a solution that will, relatively speaking, stay put once it is arrived at. In the social sciences this is usually not true. A given set of social conditions does not remain fixed, and cannot be reproduced. The action implied by the finding is often one that needs to be taken at a given time, and the value of the study may decline rapidly after that time is past.

This means that for many of the social science studies the major emphasis should be different than in the natural sciences. It means emphasis on building up and continuing as accurate and detailed a body of data as possible, developing the techniques for analysing these data quickly and dependably in relation to any given problem situation, and having constantly in hand a complex body of realistic information concerning the institutional setting in which action will need to be taken. For example, if a researcher in price analysis is to give effective aid to a marketing organization on a specific problem he must have at hand most of the necessary data, he must have tried out repeatedly on past situations his techniques of analysis, and he must be well acquainted with the practical operations of the industry and its marketing institutions. His knowledge must be broad enough and deep enough so that he can judge well the significance of the many qualitative factors that cannot be reduced to statistical form.

Similar considerations apply in studies of farm management, those pertaining to the use of credit, to studies in tenancy, farm leasing and so on. This means specialization, so far as those types of research are concerned. In some cases specialization by commodities, in others by area or type of farming, and so on.

But these operational types of research, though the ones best understood by farmers, are by no means the major phase of social science research needed by agriculture and implied by the agricultural experiment station legislation of recent years. The Act of 1935 specifies research "into laws and principles underlying basic

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[2] This is by no means universally true, however, even in the natural sciences, as any soil scientist or plant ecologist, or nutritionist will affirm.

problems of agriculture in its broadest aspects," and the Act of 1946 repeats that language. What kind of studies are thus implied? These certainly cannot be quickie studies related to some immediate operational decision. Neither can they be, if they are to be worth their cost, studies which will quickly be invalidated by changing conditions. Few of the findings can have the permanence of natural science results arrived at through long years of patient experimentation, though even these latter eventually become outdated. In most cases the social science researches are more likely to be studies of far-reaching importance that increase understanding of how the social organism works and that thus become the basis for national or state legislation, for instruction in schools and colleges, and for better orientation of the individual farmer to his environment.

Let us consider a few examples. The farmer's interest is heavily affected by monetary and fiscal policy. He has sensed that for a hundred years and at times has tried to do something about it through political action. In the 1930's he saw the value of his investment shrink by 30 billion dollars, largely as a result of monetary factors. Where are the best focal points for him to take hold in trying to stabilize this situation? In the 1920's and '30's farm leaders contended that restoring agricultural incomes would go a long way toward restoring the economy as a whole. Was this true or not? A study of that kind is no job for an amateur. It will require the best and most broadly trained people that can be found. Such a study will not be done quickly. It may take years. But if it is well done its findings will have validity for a long time to come.

Let me mention another example. The social structure of agriculture is being profoundly affected by mechanical and technological change. Because of the automobile, the highway system, the tractor, and innumerable other technological developments the whole pattern of rural schools, churches, social life, size of farm, and tenure is being modified. Whole groups of farm people are at times uprooted or rendered jobless by changes of this kind. If we are to act wisely in such situations and point the way toward constructive adjustments we must know much more about where this road is leading. Both the sociologists and economists, and also the home economists, need to work on it. It calls for large-scale studies of lasting significance.

We have huge projects like the Central Valley of California, the Missouri Valley, the T.V.A. and the Columbia Basin which may

change the lives of people in whole regions. These again are proper subjects for ably conducted long-term major studies that, if well done, will not be quickly obsolete. This does not mean that such problems can somehow be brought to a definite solution through some large-scale, specifically timed appropriation. The best we can hope for is more information, better understanding, and a sounder basis for the policies adopted.

We have proposals for extending a social security system to farm workers and employers. We know too little about how it would work or what it would mean. Yet it would affect us, our children, and our children's children. On problems like these we need able and fundamental studies on which to base our attitudes and policy. We have a marketing system in which a reduction of prices to the farmer often means an actual widening of the margin between his price and the consumer's price, and nearly always a widening of the percentage margin. Can we do something about it? The list could be enlarged almost indefinitely if time permitted and any purpose would be served. Naturally such studies cannot and should not be undertaken all at once or by any one institution. The smaller and more current ones can and should be carried on in nearly every state. The big ones require much planning, the availability of mature, well-trained researchers, and much time. Some of them will require interstate collaboration. Where they should be done and how depends very much on the location and qualifications of the available or obtainable personnel. Many studies of regional or national significance can best be carried out in some one institution. Research should not ordinarily be set up on a regional basis unless there are important reasons for so doing. Regionalization is not an objective in itself, but a mechanism for doing things that cannot be done by the cheaper, more convenient, and less cumbersome method of individual station research.

But to come more to grips with the kinds of problems faced by administrators like yourselves, we need to consider such matters in a different light. There are big unsolved problems in the natural sciences, too. With a given budget and a given set of congressional directives how shall funds be apportioned for the various kinds of research? How can the social science phase of the work be organized to get an appropriate balance between these broad, far-reaching problems and the shorter-term, small-scale projects that are more directly useful to farmers and their organizations? Certainly it

would be presumptuous to suggest any specific set of criteria. Some general comments may, however, bring up questions that you will think worthy of further consideration.

First as to balance between natural science and social science research. Certainly no hard and fast rule is appropriate, nor is uniformity between states desirable. It seems apparent, however, that, with the Acts of 1925, 1935, and 1946 the Congress expressed a feeling that experiment station research should be rounded out on the social science side.

Increased Funds are Both an Opportunity and a Responsibility

The substantial expansion in funds authorized in the Act of 1946 provides both an opportunity and a responsibility. The authorization, in other words the opportunity, is not likely to be fully implemented unless the responsibility is accepted sincerely and competently. We do not want to sacrifice the values that have come down to us from the pioneer period in agricultural research. They are important and fundamental. At the same time we cannot be content with following the patterns of the past. If the experiment stations are to continue to be accepted as the primary centers for agricultural research in the states, their programs will, of course, have to include pretty broadly the range of agricultural problems facing farmers and the general public. This means that they cannot neglect broad social problems such as those mentioned earlier. If the experiment stations omit them from their programs, studies of these types will be undertaken elsewhere, and eventually the funds appropriated will go into the channels where the kinds of work desired are being carried forward.

This does not mean that the experiment stations should follow subserviently the whims of popular interest or the directions indicated by sincere but inadequately informed proponents of this or that type of research. Researchers have a very real responsibility to exercise leadership and to help the public to see what are the important and manageable problems, and the points of emphasis most likely to be productive. The layman cannot know these things at first hand. What layman, for example, would have suggested the researches which led to the current studies of atomic energy or those of Pasteur in bacteriology, or those of Steinmetz in electricity? Farmers and other laymen can helpfully indicate their problems as

they see them. Only trained researchers and administrators can determine where research is likely to develop new information and to be significant. If the vision of administrators and researchers is too narrow or too much influenced by the patterns of the past, the research program as a whole will fail to achieve its greatest possibilities.

The Research and Marketing Act of 1946 is a case in point. Its emphasis is very heavy on marketing and on the utilization of waste products, which in the sincere opinion of its drafters were the areas offering greatest possibility of results. Is this opinion well founded? Many competent researchers have doubts, and also are of the opinion that those who discussed the problem in the hearings relating to it underestimated the amounts of research already underway in these realms and the knowledge about them that now exists. All would agree that there is much pertinent information about marketing channels, marketing margins, factors affecting costs, and so on that we do not have. There is a large field for research in marketing, but it by no means embraces the whole field on which fundamental research should be undertaken. Even in marketing there is very real danger that these funds will be dissipated in minor, fringe studies without coming to grips with the really important problems of that field. There is, of course, a place for many small-segment researches, but these in the main were feasible heretofore. They do not require or imply the elaborate, well-financed program authorized in the Act of 1946.

The administration of this and the other acts needs to be flexible and to be courageously directed toward research in the most significant and promising lines, this being done, of course, in full and frank consultation with the congressional and agricultural leaders concerned. Those leaders want significant results just as we do. If their legislative emphasis results in something other than even progress on the whole research front, in order of real rather than assumed importance and manageability, they will be ready to recognize that fact as they come into closer contact with the issues involved.

It may well be that more emphasis on the economics of consumption will be needed. Farmers and the public may very possibly find they have a growing concern with the great changes in social structure that are occurring in the rural areas which call for policy decisions on their part. There is considerable need, which many

farm leaders are coming to recognize, for study by political scientists of the workings of farmer representation in the national programs affecting agriculture, and of the policies and organization of the many federal agencies that farmers have to deal with. There is a widespread feeling that our social problems are growing faster than our understanding of how to deal with them, and even, in some circles, that the very speed of our technological progress is generating social problems we are not yet equipped to solve. On the other hand, we are almost certain to find, as our population increases and our resources are more fully used, a renewed emphasis on natural science research and conservation. If the program can be kept flexible and forward-looking, and if it can base solidly on the criteria of relative significance and amenability to research accomplishment it will be on a sound foundation, and will achieve the recognition it merits.

FARMERS' PRICE ANTICIPATIONS AND THE ROLE OF UNCERTAINTY IN FARM PLANNING

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THE study which is described below was an attempt to obtain more precise notions regarding the nature of farmers' anticipations. More specifically, it was concerned with exploring (1) the nature and degree of uncertainty attached to particular price and yield anticipations, and (2) the ways in which these anticipations were related to (stated) production plans. No attempt was made to investigate "forecast equations" for price anticipations, although these were investigated for crop yield expectations; and conjectures regarding the nature of price "forecast equations" can be formed by relating anticipations to current and past data.

The theoretical model which underlies the investigation is the currently accepted non-static theory of production.[1] In this theory there is assumed the following:

(1) That the firm is attempting to maximize something, i.e. that it is able to order various situations according to their desirability.
(2) That it is faced with conditions of production in which there exists a known time lag between plans (for purchasing or using resources, for example) and the fruition of these plans (the sale of product).
(3) That decisions are based upon anticipated values.
(4) That various situations are anticipated with various probabilities of realization (or distributions of probabilities of realization).
(5) That anticipations grow out of the current and past experience of the entrepreneur.

Assumption (1) provides conditions for consistency in the firm's

[1] Examples of non-static theories of production may be found in Gerhard Tintner, "The Theory of Production Under Non-Static Conditions," *Journal of Political Economy*, Vol. L, pp. 645–667(October, 1942) and "The Pure Theory of Production Under Technological Risk and Uncertainty," *Econometrica*, Vol. IX, pp. 305–312 (July, 1941); J. R. Hicks, *Value and Capital*, Oxford, The Clarendon Press, 1939, Parts II and IV; H. Mackower and J. Marshak, "Assets, Prices and Monetary Theory," *Economica* (new series) Vol. V, pp 261–288 (August, 1938) and A. G. Hart, "Anticipations, Uncertainty and Dynamic Planning." *Studies in Business Administration*, Vol. XI, Chicago, University of Chicago Press, 1940.

conduct, while the other assumptions are a description of what is generally believed to be the nature of the decision-making (technological and market) framework facing the firm. Assumption (5)—the postulate that there exists a "forecast equation"—makes it possible to relate values of certain variables at one point in time to the values of the same (and other) variables at previous points in time.

In devising and conducting this experiment the authors had the benefit of experience gained from a previous study.[2] Even so, it is believed that the information obtained might have been made more reliable had more time been spent in designing the interviews. Since the sample was drawn from farms in a block of six central Iowa counties where cash-grain farming predominates, the inferences regarding the anticipations of farmers as a group which one might make from this study are obviously restricted. The study may prove useful, however, in indicating pitfalls which might be avoided in further studies of similar character and in suggesting additional areas for investigation.

Data were collected by means of personal interviews with 54 Iowa farmers during March, 1947—a period just prior to the beginning of crop operations. The interviews were designed to obtain some notions regarding (1) the most probable values of the distributions of anticipated prices, (2) the dispersions of these distributions, (3) the farmers' production plans, (4) farmers' beliefs with respect to technological conditions which deterred plans from conforming to what otherwise would appear as profit maximizing plans and (5) the "uncertainty preferences" of farmers.

Corn and Soybean Price Expectations

Each of the farmers interviewed was asked to indicate (as of March, 1947) what he anticipated as the most probable prices which would be paid for corn and for soybeans in December, 1947. The answers to this question may be considered as being somewhat ambiguous since prices differ with the grades of the product, and the pattern of prices varies geographically, yet no definite grade or place at which this price would be paid was specified. However, it is presumed that the place which the farmers had in mind was

[2] See T. W. Schultz and O. H. Brownlee, "Two Trials to Investigate Expectation Models Applicable to Agriculture," *Quarterly Journal of Economics*, Vol. LVI, pp. 487–496 (May, 1942).

central Iowa and that farmers were referring to the average grade of the commodity. The frequency distribution of expected most probable prices for these two crops is given in table 1.

TABLE 1. FREQUENCY DISTRIBUTION OF MODAL PRICE EXPECTATIONS FOR CORN AND SOYBEANS

CORN			SOYBEANS		
Most probable anticipated price per bu.	Frequency of anticipation		Most probable anticipated price per bu.	Frequency of anticipation	
	Number	*Percent*		*Number*	*Percent*
$1.50	7	13	$3.70	1	2
1.25	6	11	3.00	3	6
1.15	1	2	2.85	1	2
1.10	4	7	2.75	3	6
1.05	1	2	2.60	1	2
1.00	23	43	2.50	14	30
.90	4	7	2.35	1	2
.85	1	2	2.25	6	13
.80	6	11	2.15	1	2
.75	1	2	2.10	1	2
			2.05	1	2
Mean $1.07	54	100	2.04	6	13
			2.00	5	11
			1.85	2	5
			1.80	1	2
			Mean $2.37	47	100

The mode of the frequency distribution of anticipated most probable corn prices ($1.00) was below the cash price of corn at the time the interviews were made. Also some farmers' anticipated most probable prices were below the "support price" for corn—a support price to which the government was committed through December, 1948. The mode of the frequency distribution of most probable soybean prices was also below the March, 1947, cash price.

These expectations were consistent with the expectations regarding movements in the general level of farm prices. The farmers in this sample were generally pessimistic regarding the movement of farm prices between March and December of 1947, only 8 of the 54 farmers interviewed believing that a given farm price index would be as high in December, 1947, as in March, 1947, the remainder believing that the index would be lower.

In addition to the anticipated most probable prices for December, 1947, each interviewee was asked what he thought was the proba-

bility that the price would be either as much as 25 cents above or below the most probable price—i.e., the interviewee was asked to specify his estimate of the probability that the price would lie within a given 50-cent range. One could not ascertain from the interviews whether a very high percentage of the interviewees had ever formulated their anticipations in terms of probabilities. Consequently, the answers to this question may not be very meaningful as a clue to the nature of expectations.[3] The frequency distribution of the probabilities that the December price would lie within this 50-cent range is indicated in table 2.

TABLE 2. FREQUENCY DISTRIBUTIONS OF ANTICIPATED PROBABILITIES THAT DECEMBER, 1947 PRICES WOULD FALL WITHIN THE RANGE OF 25 CENTS ABOVE OR BELOW THE ANTICIPATED MOST PROBABLE PRICE

CORN PRICES			SOYBEAN PRICES		
Probability	Frequency		Probability	Frequency	
	Number	*Percent*		*Number*	*Percent*
1.0	6	12	1.0	1	2
.9	14	29	.9	9	21
.8	11	23	.8	10	24
.7	1	2	.7	4	10
.6	1	2	.6	4	10
.5	12	25	.5	12	29
.4	1	2	.4	2	4
.1	2	5	does not know	12	
does not know	6			—	—
	—	—		54	100
	54	100			
Mean (48 observations) 0.73			Mean (42 observations) 0.69		

Additional information relating to price anticipations was obtained through questions designed to determine the symmetry of the distributions. Each farmer was asked whether he thought that a realized price higher than the anticipated most probable price was more likely, equally likely, or less likely than a realized price lower than the anticipated most probable price. Similarly, each interviewee was asked whether a realized price as high as 25 cents above the anticipated most probable price was more likely, equally likely, or less likely than a price as low as 25 cents below

[3] It is interesting to note that some of the interviewees were asked to specify their estimates of the probability that the price would fall outside the 50-cent range and that these answers were not always consistent, i.e., the sum of the two probabilities were not always equal to unity.

the anticipated most probable price. Replies to these questions are summarized in tables 3 and 4.

TABLE 3. DISTRIBUTION OF REPLIES TO QUESTION RELATING TO PROBABILITY OF A REALIZED PRICE IN EXCESS OF ANTICIPATED MOST PROBABLE PRICE AS COMPARED WITH A REALIZED PRICE BELOW ANTICIPATED MOST PROBABLE PRICE

	Corn		Soybeans	
	Number	*Percent*	*Number*	*Percent*
just as likely	13	25	12	27
more likely	18	35	17	39
less likely	21	40	15	34
does not know	2		10	
	54	100	54	100

TABLE 4. DISTRIBUTION OF REPLIES TO QUESTIONS RELATING TO PROBABILITIES OF A REALIZED PRICE AS MUCH AS 25 CENTS ABOVE ANTICIPATED MOST PROBABLE PRICE AS COMPARED WITH A REALIZED PRICE AS MUCH AS 25 CENTS BELOW ANTICIPATED MOST PROBABLE PRICE

	Corn		Soybeans	
	Number	*Percent*	*Number*	*Percent*
just as likely	10	20	5	13
more likely	23	45	20	51
less likely	18	35	14	36
	51	100	39	100
does not know	3		15	

Plans

An important aspect of the study of anticipations is the manner in which they are incorporated into plans. Such an investigation must take cognizance of the basic motivating factors in planning—the objectives which the farm operator is attempting to achieve. This area was not thoroughly probed by this study. However, an attempt was made to gain some insight into the importance of various economic and technological elements in conditioning plans. The framers were quizzed regarding differences between their 1946 acreages of corn, soybeans and oats and their 1947 plans for these crops. The planned changes are summarized in table 5, and a classification of the stated reasons for change is presented in table 6.

The magnitude of the changes was not determined so that relatively small changes are weighted equally with relatively large

changes in this summary. Of significance for further investigation is the apparent importance of technological rather than market considerations in accounting for the frequency of changes over time. Although one cannot assign probabilities to generalizations made from these observations, they check with the relative year to year insensitivity of crop acreages to relative prices for the U. S. as a whole.[4] The importance of technological considerations is also

TABLE 5. NUMBER OF INDIVIDUALS PLANNING A CHANGE IN CERTAIN ACREAGES IN 1947 AS AGAINST 1946

	No. planning an increase		No. planning an decrease		No. planning no change		Unclassified*
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	
Acreage in corn	24	47	15	29	12	24	3
Acreage in soybeans	21	41	3	6	27	53	3
Acreage in oats	11	22	26	51	14	27	3

* Includes operators who were farming totally different land in 1947 than in 1946.

TABLE 6. OPERATOR'S REASONS FOR PLANNING CHANGES IN CROP ACREAGES IN 1947 AS AGAINST 1946

Reason stated	Number of individuals		Percent of positive statements	
Unclassified*	3			
No reasons stated**	7			
		10		
Last minute contingencies of weather	3		7	
Consideration of feed and livestock requirements	9		20	
Considerations of price and anticipated profitability	13		30	
Soil-improvement and rotational influence	19		43	
		44		100

* Includes operators who were farming totally different acreages in 1947 than in 1946.

** Includes operators who were not planning a change in any crop acreage.

suggested by the fact that 50 of the farmers had their spring crop plans outlined in the fall (four to six months in advance of the dates of execution) and only 10 indicated that any changes in plans had been made during the winter, five indicating revisions due to ex-

[4] Refer to T. W. Schultz, "The Economic Stability of American Agriculture"; *Journal of Farm Economics*, XXIX: pp. 809–26.

pected changes in relative prices. The accuracy of answers to these questions regarding changes in plans cannot be checked since the initial plan was not observed. However, these answers suggest considerable inflexibility in changing plans in response to anticipated price changes. Additional support for this hypothesis is suggested in the replies to a question regarding reactions to a postulated 20 percent increase in the anticipated most probable price of corn. Only 2 farmers indicated that they would expand corn acreage. While these answers are hypothetical responses to purely hypothetical situations and should not be interpreted as the way in which all of these farmers would have responded to actual situations, they suggest not only inflexibility in plans but also a considerable lack of confidence in the anticipations which were formed.

Reasons for Inflexibility in Response to Anticipated Price Changes

Questions relating to yield expectations were also included in this survey. The interviewees were asked to specify the average corn and soybean yields which they expected over the five-year period, 1947–51. The average expected yields for all farmers answering the question were almost identical with the average yields which they thought had prevailed during the previous five years. Although a previous study indicates important memory errors in reporting past yields,[5] these errors are unimportant in formulating a yield "forecast equation" for the aggregate of farmers as long as the nature of the errors is known.

Not all farmers expected yields during the subsequent five years to average the same as during the previous five years. Anticipated improvements in soil fertility and cultivation was given most frequently as a reason for an increase in the anticipated average future corn yield, while unfavorable weather was most frequently presented as the factor expected to be responsible for a reduction in the average future yield.

An attempt to measure the uncertainty attached to corn yield expectations was made through questions relating to the probability that the yield during any single year in the five-year period in the future would fall as low as 20 bushels below the expected average

[5] Refer to O. H. Brownlee, "Memory Errors as They Affect Survey Data," *Journal of Farm Economics*, XXII (May, 1940).

yield or would rise as high as 20 bushels above the expected average yield. Replies to these questions are summarized in table 7.

Although not enough questions were asked regarding crop yield expectations to permit an accurate formulation of the degree of uncertainty attached to these expectations, it appears likely that less uncertainty is attached to them than to price expectations. For example, the anticipated average of yields over 10 years in

TABLE 7

Situation	No. of Replies
(1) Yield in any one year *more likely* to exceed most probable anticipated value than to fall below it.	22
(2) Yield in any one year *less likely* to exceed most probable anticipated value than to fall below it.	13
(3) Yield in any one year *equally likely* to exceed most probable anticipated value as to fall below.	11
(4) No reply.	8
Total	54

the future probably is expected with considerable confidence (i.e., the expected probability of a large departure of the realized average from the anticipated average is small).[6] Interviewees hardly would hazard a guess regarding the average ratio of corn and oats prices or corn and soybeans prices over a 10-year period in the future. A higher degree of confidence in anticipations regarding technological factors than in anticipations regarding prices may be important in the apparent overweighting of technological considerations in planning.

In addition to the degree of uncertainty attached to anticipations, the preferences of the farmers for greater certainty should be known before we can evaluate the importance of uncertainty in planning. Lange[7] and Makower and Marshak[8] have suggested that different probability distributions of anticipated values might give rise to the same plan. For example, sellers might respond in the same man-

[6] Questions relating to this aspect of the problem were asked during the initial interviews but were deleted.

[7] Oscar Lange, *Price Flexibility and Employment*, Bloomington: The Principia Press, Inc., 1944, pp. 30–31.

[8] H. Makower and J. Marshak, "Assets, Prices and Monetary Theory," *Economica* (N. S.), Vol. V. pp. 261–88 (August, 1938).

ner to a distribution with a given anticipated most probable price and a given dispersion as they would to another distribution with a higher anticipated most probable price and a higher dispersion. The relationships between these various distributions would describe the aversion to uncertainty. It is with reference to this hypothesis that the questions relating to uncertainty preferences were based.

Each farmer was asked to imagine that some agency offered to purchase in March, 1947, all of his prospective corn and soybean crop for delivery in December, 1947. He was then asked to state what price he would have to receive in order to close such a deal. These answers were then compared with the anticipated most probable prices and degrees of uncertainty which each individual had registered earlier as his estimate of future conditions.

That the situation presented to them was purely hypothetical was obvious to most of the farmers interviewed. In fact more than one-third of the interviewees either refused to answer the question or stated that they would not accept a contract at any price. Nearly all of the farmers answering the question, however, indicated a preference for uncertainty. This result is somewhat surprising. The replies to the questions relating to uncertainty preferences are summarized in table 8.

TABLE 8

	Corn		Soybeans	
	Number	*Percent*	*Number*	*Percent*
Present 'asked' price lower than modal price anticipation	1	2	3	7
Present 'asked' price higher than modal price anticipation	25	51	19	44
Present 'asked' price about the same as modal price anticipation	6	12	4	9
No contract under any conditions	17	35	17	40
	49	100	43	100
Does not know	5		11	
	54		54	

Suggestions for Further Research

Except for the absence of "forecast equations" relating to price expectations, an experiment of this type is complete in the sense that it describes anticipations and plans and their interrelationships

at one point in time. Such an experiment is incomplete in that it has not traced the divergences between the plans that were actually effected and those stated by the interviewees. Nor has it noted the manner in which the plans were unrealized and the revisions in anticipations and plans which grow out of the divergences between anticipated and realized values. Also in this particular experiment the farmers were not probed sufficiently to permit a detailed description of the uncertainty attached to anticipations or a complete description of uncertainty preferences.

Any importance which might be attached to this study lies not in the estimates of various coefficients which might be computed from the data which were collected but in the hypotheses which are suggested for testing in subsequent studies and the methods which might be employed in collecting the information. Among the hypotheses which are suggested for investigation in future research along similar lines are:

1. That technological uncertainty is considerably less than price uncertainty and that consequently farmers weight more heavily than appears rational technological considerations in formulating their production plans.
2. That most farmers are unaware of the existing institutions for reducing price uncertainty (the commodity futures markets, for example) and might make use of these institutions if the implications were clearly set forth for them.
3. That firms do not conceive uncertainty in terms of a probability distribution (or probability distributions) of anticipated values. If this hypothesis were confirmed it would necessitate discarding a part of the model used in this analysis.

Among the suggested procedures for further research along similar lines are:

1. Periodic interviewing of a selected group of farmers to note the manner in which plans are formulated, revised and finally translated into action. Such periodic contacts with the farmers might also permit a formulation of the way in which anticipations are formed.
2. Minimization of the number of questions relating to hypothetical reactions to hypothetical situations. Such questions cannot be completely eliminated if adequate notions regarding uncertainty and reactions to uncertainty are to be obtained. However, it must be recognized that the replies given to such questions do not accurately describe the responses which would in fact occur if the hypothetical situation actually faced the farmer.

JAPAN: THE RACE BETWEEN FOOD AND POPULATION

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RECENT events in the Far East have once again brought the occupation of Japan to the attention of the American public. The imminent conquest of the Asiatic mainland by China's Communists has compelled observers of Far Eastern affairs to ponder the significance of the swift turn of events in China upon the Allied occupation of Japan. The general elections held in Japan in January of this year have attracted considerable attention because of the surprising strength shown by the Japanese Communists. While Communist domination of certain strategic labor unions has been an acknowledged fact, the Communist party had been regarded as a negligible force in the general political arena. Their capture of over 10 percent of the popular vote is reported to have surprised even the Communist leaders, and the significance of that spurt of popularity should not be overlooked.

The recent visit to Japan by ex-Secretary of the Army Royall has also tended to focus attention upon problems of occupation policy in the Pacific. In particular, statements alleged to have been made by him in his "secret" press conference in Tokyo seem to suggest uncertainty in United States policy toward Japan. Despite ex-Secretary Royall's disclaimer, the press dispatches were consistent in reporting that he raised the question whether the United States would attempt to defend Japan and utilize it as a base in the event of war with Russia. His reported comments seem to indicate that he is inclined to regard Japan as a potential military liability, and the defense of Japan as a responsibility which the United States should not undertake. He appeared to be particularly concerned about the problems of feeding Japan's 80 million people and maintaining a flow of raw materials for her factories under wartime conditions—problems which would be of decisive importance if Japan were to be utilized as a strategic base.[1]

[1] In *San Francisco Chronicle*, Feb. 17, 1949 *cf.*: United Press dispatch, Washington, D. C., Feb. 16, p. 1; Peter Kalischer, United Press dispatch, Tokyo, Feb. 17, p. 2; Russell Brines, Associated Press dispatch, Tokyo, Feb. 17, p. 2. The Brines article stresses the fact that ex-Secretary Royall was speaking hypothetically, but his report confirms Kalischer in all of the important points.

The problem of United States withdrawal from Japan in the event of war with Russia—or in anticipation of such a war—is highly complex and involves an important moral issue as well as problems of logistics and military strategy. On the moral issue, one group takes the position that the United States is obligated to provide protection for a defenseless Japan while the opposing group believes that the demilitarization of Japan by the United States has not created any obligation to defend Japan. Fortunately, these questions are merely hypothetical at present, but it seems likely that predilections regarding Japan's strategic value in the event of war and views on the degree of United States responsibility to defend Japan will influence policies with regard to American assistance to promote Japan's economic recovery.

Apart from the question of her potential strategic importance in the event of war, Japan stands now as the most important testing ground in the Far East in the ideological and political conflict between Soviet Communism and the doctrines of liberty and constitutional government represented by the United States and Western Europe. Here again the problems of food and population are of fundamental importance. Just as the logistic problem of feeding Japan's population is recognized as a major problem in the event of war, the economic problem of securing an adequate food supply is of crucial importance to Japan in time of peace.

With a population which has now reached 81 million and a total land area slightly smaller than the State of California, the existence of a food deficit in Japan can be readily understood. Intensive cultivation of the available land and the heavy application of fertilizers are responsible for crop yields per acre among the highest in the world. In spite of the long-standing intensive efforts to maximize Japan's production of home-grown food, it was necessary before the war to supplement domestic production with food imports which averaged well over three million tons annually.

During the past three years food imports have been at about 60 percent of the prewar volume, and this reduction of imports in the face of a sharp increase in population has made it necessary to continue a strict program of food collections and rationing. Notwithstanding the restricted level of imports and food consumption, the food-import bill is averaging $250,000,000 a year; imports of fertilizer to sustain Japan's agricultural production, and petroleum products for the fishing fleet and other uses amount to an additional

$75,000,000 annually. These are facts of considerable importance to the American taxpayer. With a negligible volume of exports, Japan has had no financial resources with which to pay for these relief supplies. In accordance partly with obligations of international law, but also for humanitarian and practical reasons, it has been necessary for the United States to provide Japan with imports of food, fertilizer, and other supplies required "to prevent starvation, disease, or unrest."

Very little has been accomplished to date in enhancing Japan's ability to pay her own way in financing necessary imports by sales of Japanese exports in world markets. It is generally recognized that the importation of key industrial raw materials is a prerequisite for any significant increase in the volume of Japanese exports. Relief appropriations for Japan have approximated $400,000,000 a year, but nearly all of this money has been required for food and other supplies needed to maintain the civilian population. The need for a longer-range program to facilitate raw-material imports of textile fibers, iron ore, and a host of other materials required to expand industrial production and the volume of exports has been widely recognized.

In the fall of 1947 a program for Japan's economic recovery was prepared by "SCAP"—General MacArthur's headquarters as Supreme Commander for the Allied Powers. In April 1948, a committee which included Percy H. Johnston as chairman, Paul G. Hoffman, Undersecretary of the Army William Draper, Robert F. Loree, and Sidney H. Scheuer surveyed the economic situation in Japan and recommended Congressional approval of a program to promote economic recovery in Japan and Korea by providing funds needed to restore the flow of raw-material imports.[2] Instead of voting funds for the economic-recovery budget presented by the Department of the Army, the Congress broadened the language of the GARIOA[3] relief budget to permit the use of these "disease and unrest" funds to promote economic recovery and the total appropriation for Japan, Germany, and Korea was increased from 1.25 billion to 1.3 billion dollars. By adjusting allocations between areas the Department of the Army has been able

[2] Percy H. Johnston, Paul G. Hoffman, Robert F. Loree, Sidney H. Scheuer, *Report on the Economic Position and Prospects of Japan and Korea* . . . (Secretary of the Army's Committee to Inquire into Economic Problems of Japan and Korea, April 26, 1948, mimeographed).

[3] Government and Relief in Occupied Areas.

to allot something over 50 million dollars to finance raw-material imports to Japan during the current fiscal year. The prospects for appropriated funds to finance imports of industrial raw materials during the fiscal year beginning next July are obscure at this time, but it is probable that there will be an increase over the current fiscal year in order to support a more rapid expansion of the volume of exports.

The occupation in Japan has represented a bold experiment in seeking to redirect the thinking and activity of the Japanese people along democratic and peaceful lines. It is premature to draw any confident conclusions concerning the long-term success or failure in achieving the positive objectives of the occupation. Nearly all serious observers of the Japanese occupation agree, however, that gratifying progress has been made to date. The demilitarization of the home islands—the negative phase of the occupation—was carried out with dispatch. A liberal constitution has been adopted and the Japanese people are making strides in governing themselves by democratic institutions and procedures. The cult of State Shinto, which fostered a fanatic nationalism and supported Japan's military aggression, has been rooted out. Major reforms have been introduced in education and other fields to promote ideas and beliefs required to establish a democratic society in place of the feudalistic Japan which plotted and waged the recent Pacific war.

Although the results of the first three years offer considerable hope for a successful outcome, it will be years before the newly established democratic institutions and practices take firm root. In the meantime, Japan's fledgling democracy must face the possibility either of a resurgence of the reactionary, militarist groups, or of domination by the ambitious Communist party. In the present world situation it is probable that the Communist threat is the more serious, and as usual the existence of prolonged economic hardship will be a potent ally of Communism. If Japan's new democratic government coincides for a prolonged period with economic instability and severe hardship, it will encounter great difficulty in winning a genuine acceptance in the minds of the Japanese people. The supply of food will be the most basic factor influencing the standard of living of the average Japanese family; and the prospective food supply depends in turn upon the prospects for increasing home-grown food production, the possibilities for

securing additional food by trade, and the relations between future population growth and the supply of food. Regardless of any shifts in American occupation policy, those three elements—food production, trade, and population—will be basic factors underlying economic and political developments in Japan.

Pre-War Food and Population Balance

It is not surprising that the economic history of Japan in the modern era has been dominated by problems of food and population. In any country the supply of food is a major factor in determining the standard of living of the people. In Japan there is a very apparent tendency for the average person to identify his general well-being with the supply of food, and especially with the supply of rice. The special significance of rice, the staple food of the Japanese diet, is vividly portrayed in a rough translation from a history of Japanese food and agriculture: "When people talked of food problems in Japan, it was nothing but rice problem. There has been no greater suffering to Japanese than the absence of rice to eat on the morrow. Moreover, the rice must be 'Japanese rice' (indigenous species), as a proof of which formerly foreign rice [imported from countries other than the former Japanese colonies of Korea and Formosa] was commonly called 'China rice,' and in spite of its cheap price, those who purchased it were ashamed to be seen, being taken as lower classes, or it was propagated with exaggeration that those who consumed it would have disorderly bowels or diarrhea."

The preference of the Japanese people for rice is still a factor to be reckoned with, but the far more basic problem at the present time is maintaining a supply of food—regardless of kind or taste preference—which will provide sufficient energy for an efficient working population. The direct relationship between adequate food energy and economic recovery is obvious, but the indirect relationship in terms of inflationary pressures and instability stemming from an acute food shortage is probably of even greater significance. Inasmuch as a reasonably adequate supply of food can only be secured by supplementing indigenous production with imports, it is clear that the attainment of economic selfsupport—with exports sufficient to cover the cost of necessary imports—is intimately related to the problems of food and population.

The period since Japan emerged from isolation and embarked

upon industrialization and international commerce has been marked by an enormous increase in population—from a level of 30–35 million in the three centuries preceding 1868 to 81 million at the present time. The population is currently increasing at the rate of 1.3 to 1.4 million persons per year. The sharp increase in population during the modern era has been due to reductions in the death rate while the birth rate remained high. The introduction of medical science, improved knowledge of personal hygiene and public health, and economic advances resulting from industrialization brought about a sharp reduction in infant mortality rates and lowered the death toll due to disease and epidemics. This pattern will be recognized as essentially the same course which characterized population growth in Western Europe and America with the industrialization of the nineteenth century.

Unless some unexpected change occurs in the birth rate or death rate, it is anticipated that Japan's population will increase to about 87 million by 1953. If approximately the same rate of annual increase should continue, the population would reach nearly 100 million by 1960. Two factors will be decisive in determining whether the actual increase will be as great as these projections: first, the extent to which the death rate is controlled; and secondly, the extent to which the birth rate is left uncontrolled.

In the two decades between the first and second World Wars, there was evidence of a decline in the rate of growth of the Japanese population. Total population continued to increase rapidly during those years, but fertility rates among women of child-bearing age showed a moderate downward trend. It seems reasonably certain that this declining tendency of the birth rate is evidence that some knowledge of birth control was available and practiced. The return to Japan of several million demobilized servicemen after the surrender was followed by an abnormal increase in births which makes it difficult to discern the present trend of the birth rate. It appears that knowledge of birth control has not yet become general, and consequently the practice of birth control in the years ahead will depend to a very considerable degree on action which is (or is not) taken to promote wider knowledge of birth control methods.

In the years prior to the War Japan's problem of securing an adequate supply of food for her growing population was a public issue of the first magnitude. Emphasis was initially placed upon

measures to increase production of home-grown food. The most important gains in domestic food production were achieved through marked increase in crop yields per acre of cultivated land. Scientific improvements in the fields of plant breeding and seed selection, expansion of irrigation and drainage facilities, and the increased use of chemical fertilizers made notable contributions to increasing the yields per acre and to reducing vulnerability of crops to damage from disease, insects, drought, and floods. The most conspicuous gains were achieved in rice, which showed an increase of over 100 percent in the average yield per acre between 1878 and 1937. Some increase in production was also brought about through expansion of crop acreage which increased some 40 percent in the same 60 year period. Possibilities for increasing acreage were limited, however, and the increase in the 20 years preceding 1937 was less than 5 percent.

Beginning with World War I there was an increasing reliance upon food imports to fill the deficit which occurred as population growth outstripped the increase in home-grown food supply. With the growing need for food imports systematic programs were instituted in Korea and Formosa, Japan's former colonies, to develop those areas as Japan's primary and assured sources of food supply. Comprehensive, effective, and in many instances high-handed measures were carried out to increase the production of rice in Korea and of rice and sugar in Formosa. This program even went to the extent of requiring Korean and Formosan farmers to shift from their traditional seed to Japanese varieties of rice. Practices in land tenure, such as the collection of heavy land rents in kind—sometimes equalling 50 to 75 percent of the crop—were encouraged in order to insure that the largest possible percentage of the colonial output would be exported to Japan. Particularly in Korea the increase in exports of rice was considerably greater than the increase in production. The increase in exports to Japan was realized at the expense of a material reduction in the domestic consumption of rice in Korea which was partially made up by increased consumption of cheaper millets and sorghums.

From the Japanese viewpoint a fairly satisfactory solution of the food problem was achieved in the years prior to the outbreak of the War. In the 1930's rice imports of 1½–2 million tons (virtually all of it from Korea and Formosa) were added to the indigenous production of 9–10 million tons of rice. This sufficed to provide an

ample supply of rice, and in the early 1930's actually contributed to a problem of surplus and depressed agricultural prices. In addition to the rice imports, nearly a million tons of sugar a year was imported from Formosa, and soybean imports from Manchuria of some 600,000 tons annually provided an important protein supplement in the Japanese diet. The typical diet was somewhat inadequate from a nutritional standpoint because it contained too much starch, too little animal protein, and was characterized by certain vitamin and mineral deficiencies. Nevertheless the food supply provided sufficient energy for an active population at a cost which was not burdensome, and hunger was felt by only a small percentage of the population.

Occupation Food Policies

During the period of the occupation, food imports to Japan have been restricted by the world food shortage and the fact that the funds provided for this purpose by Congress were calculated on the basis of imports required to maintain a ration level sufficient only to prevent "disease and unrest." In November 1948, the ration level was increased from 1300 to 1440 calories for "normal consumers" with corresponding increases for other ration categories. This increase represented an important part of the current program to enlarge industrial production and expand Japanese exports in order to enhance Japan's ability to foot the bill herself in financing necessary imports.

The food rationing program in Japan is extremely comprehensive. It encompasses all the grains, potatoes, sugar, edible oil, and soybean products. Together these items comprise some 85–90 percent of the calories in the Japanese diet. Even fish (the most important source of animal protein) and vegetables are rationed in the larger cities in spite of technical difficulties occasioned by their perishability, seasonal variations in supply, and other factors.

Although rationed foods have been made available at prices well within the reach of the average consumer, the purchase of supplementary food on the blackmarket at exorbitant prices has had an extremely inflationary effect on the cost of living. At least until the increase in the ration from 1300 to 1440 calories, it was a matter of necessity, not luxury, for most consumers to obtain additional food energy from rice, potatoes, and other staple foods purchased on the blackmarket. The food which finds its way into the black-

market is lured away from the farms, in part as a reduction of the farmer's own consumption level, by blackmarket prices as much as ten to twenty-five times the official price. The inflationary impact of blackmarket food purchases at such prices is obvious and is largely responsible for the fact that food represents approximately two-thirds of the total cost of living of urban consumers. The high and steadily rising cost of food has been a major factor underlying the wage-price spiral which has created the dangerous inflationary situation in Japan today.

During 1948 there was moderate improvement in living standards and a slowing down of the rate of inflation. More regular distribution of the basic food ration and larger supplies of vegetables and fish have been important factors contributing to this improvement. It can also be expected that the recent increase in the food ration will result in some further improvement in the situation. It should be stressed, however, that even with this recent improvement in living levels, consumption of the two most basic ingredients—food and textiles—is still meagre and below prewar levels. Inflation continues to create serious economic hardship for the average Japanese and to hamper efforts to increase production and exports.

It must further be borne in mind that economic gains thus far have been possible only because United States funds appropriated for food and other relief supplies have offset the deficit between the cost of Japan's imports and the income from her exports. Needless to say, that highly abnormal situation must be brought to an end as early as practicable, and Japan's economy cannot be regarded as stable until such time as she has regained a balance in her international payments.

Foreign Trade Expansion Possibilities

In the years ahead the adequacy of Japan's food supply will be determined primarily by the degree of success achieved in expanding foreign trade. It is generally agreed that home-grown food production cannot be expanded to the point of complete self-sufficiency. Despite the high priority now being given to land reclamation and other measures to increase food production, it seems certain that the increase in population will more than offset the prospective increase in food supply—barring some revolutionary and unforeseen improvement in agricultural technique. Without the possibility of augmenting domestic supplies with imported food, Japan would

be faced indefinitely with an almost hopeless problem of overpopulation.

In the future as in the past, if sufficient foreign exchange can be obtained through export sales to pay for required imports, the deficiency in home-grown food can be offset by food imports. Unless we assume a world of economic "autarky" with rigid trade barriers and extreme emphasis on national self-sufficiency, dependence upon food imports is not necessarily an undesirable condition. England, whose economic problems parallel those of Japan in many important respects, adopted policies in the last century which increased her reliance on imported food because it was considered advantageous to promote trade and industry even though domestic agriculture was expected to suffer from the freer flow of international commerce.

The question of Japan's ability to finance adequate food imports in the future is an integral part of the broader problem of when and how Japan can become economically self-supporting. Although a detailed analysis of prospects for trade expansion and achieving a balance of international payments is beyond the scope of this article, it is necessary to consider a few of the highlights of that problem. Since the future food supply position will be determined primarily by the level at which a balance of payments is achieved, the nature of the outlook for a successful revival of trade is of crucial importance in evaluating policies with respect to food and population.

The basic weaknesses in Japan's foreign trade position are well known. The dearth of natural resources available in Japan aggravates the foreign trade problem, since nearly all of the important export products depend entirely or in part on imported raw materials. Silk, marine products, tea and a few minor items such as peppermint and pyrethrum complete the list of exports which can be produced from Japan's indigenous resources. Textile exports are the mainstay of Japan's foreign trade, but apart from silk her textile production depends almost entirely on imported raw materials. Machinery products, which are counted upon as the major field for export expansion, depend upon imports of high-grade iron ore, coking coal, and other raw materials. Foreign exchange funds must therefore be earned not only to pay for imports of food and other commodities required to meet Japan's needs for domestic consumption, but also to finance costly imports of raw cotton, iron

ore, and other commodities required as raw materials for her export industries. Food imports of roughly half a billion dollars (at current prices) would be needed to provide a food supply approaching prewar levels, but it is estimated that a balanced international trade which would permit food imports of that magnitude would also involve imports of industrial raw materials and a multitude of other products which in total would amount to another billion dollars of imports a year. Thus exports would have to reach a level of about a billion and a half dollars annually for Japan to attain self-support at a level which would approximate prewar living standards.

Despite the problems involved, Japan in prewar years actually achieved a balance of international trade which provided a fairly adequate food supply and a tolerable level of living. The postwar situation is characterized, however, by certain special factors which bode ill for Japan's foreign trade in the years ahead. These factors include the economic dislocations associated with war which are familiar to the American public because they are so pertinent to the Marshall Plan for European recovery. The problems of war damage and obsolete equipment, low levels of industrial production, depleted working capital, plant operation at a fraction of capacity levels, and high costs of production are all important features of the economic scene in Japan today.

There is reason to believe, however, that the problems of production will be much more susceptible of solution than those which affect so adversely Japan's foreign trade prospects in Asia. The highly unstable political, economic, and military situation in China, Indonesia, French Indo-China, and to a lesser extent Burma, is of the greatest significance to Japan. The Far East is by logic and economics the major source of supply for imports to Japan and the best market for Japanese exports. A closely related consideration is the fact that Korea, Formosa, and Manchuria are no longer in the picture as major sources of food supply. Recently Formosan sugar has been purchased for Japan, but apart from sugar from Formosa those three areas cannot be considered as potential sources of food imports for Japan. (Korea may possibly resume rice exports on a limited scale in a year or two, but population, political, and economic factors make it improbable that Korea will again become a major source of food supply for Japan.) The other major food exporters of Asia—Burma, Siam, and French Indo-China—are

only gradually approaching their prewar volume of exports and cannot be expected to make a very large contribution to filling the gap resulting from the elimination of Korea, Formosa, and Manchuria as sources of supply. For several years at least, Japan must continue to rely in large measure upon food imports from the United States.

Importation of wheat from the United States in lieu of rice from Asia raises a number of problems. The preference of the Japanese for rice can conveniently be omitted from discussion, because it is quite possible that in the long run that factor would be offset by the lower cost of wheat as compared with rice. The major significance of the reliance on grain imports from the United States is that the necessity to make substantial dollar purchases of food aggravates the problem of securing a balance of dollar payments which promises to be the most difficult aspect of the overall problem of securing a balance of international payments. In former years when international trade was more characteristically a multilateral affair, the problem of maintaining a balance of trade between two particular countries or two particular currencies was of no great significance. At the present time, however, when trade restrictions and nonconvertibility of currencies are the order of the day, the problem of securing a balance of dollar payments is of major importance. The restricted opportunities for exporting Japanese products to the United States to offset the cost of purchases of food and raw cotton in this country will make the solution of that problem extremely difficult. In prewar years Japan's purchases of raw cotton in the United States, which averaged $166,000,000 annually (1930–34), were offset in large measure by raw silk sales to the United States of about $135,000,000 a year. The preference of the American woman for nylon stockings has reduced the market for raw silk exports to a fraction of the prewar volume and is another significant factor aggravating Japan's dollar problem.

The dollar problem is only one aspect of the way in which governmental controls on foreign trade can be expected, for some years at least, to have a generally restrictive effect on the expansion of foreign commerce which in the case of Japan will enhance the difficulty of attaining a self-supporting status. Restrictive regulations such as exchange controls, export and import quotas, limitations on private trading and other characteristic features of international trade thus far in the postwar era have increased greatly the com-

plexity of carrying on trade and have been responsible for the failure to develop numerous potentialities for trade. These features have characterized the trade of England and the other countries of the Sterling Bloc, and they have been an even more conspicuous feature of foreign trade in Japan itself.

Foreign trade, like all other aspects of Japan's international relations, is under the control of "SCAP"—General MacArthur's headquarters as Supreme Commander for the Allied Powers. In the initial stages of the occupation no other course was possible. Although many restrictions have since been removed, foreign trade is still essentially a SCAP-controlled operation. In the absence of a foreign exchange rate for the Japanese yen and with SCAP in the position of being responsible for insuring that United States funds are utilized as effectively as possible, this is wholly as would be expected. Furthermore, the economic dislocations involved in the present situation make inevitable a considerable measure of government control. Nevertheless it cannot be denied that the red-tape of a "double bureaucracy"—SCAP and the Japanese Government—tends to retard the development of trade.

There are additional unfavorable factors in the postwar situation which are related directly to Japan's defeat. The destruction of her merchant marine during the War has changed Japan from a maritime nation of the first order to a country which relies almost entirely on foreign vessels to carry her exports and imports. An invisible export of considerable magnitude in prewar years has thus been converted to a charge of some $60,000,000 annually for shipping services which must be paid in dollars or other foreign currency. A somewhat related problem is the restriction of the areas in which Japan is permitted to fish, for reasons of security as well as the objections of the countries concerned to having Japanese fishermen enter the waters adjacent to their shores. The prohibited waters include the Kamchatka crab fisheries offshore from Soviet Siberia and the bonito and tuna fisheries of the central Pacific. The fisheries centered in those two areas were the source of a major part of the high-grade marine products which formerly provided Japan with a highly profitable export. Limitations imposed on travel and foreign residence of Japanese businessmen constitute another restriction upon the development of trade. The job of promoting sales of a host of export items ranging from rice bowls to cameras and electric refrigerators is an operation which does not

lend itself to trade negotiation by remote control, and the lack of qualified salesmen on the spot has unquestionably had a deterrent effect on the sales of many export products.

Population Growth Aggravates Problem

It is clear that a satisfactory solution of Japan's food problem will be impossible without a substantial trade recovery including an increase of exports to seven or eight times the present level. Careful consideration of the problems involved in Japan's trade recovery leads unavoidably to the conclusion that the solution of these problems will be extremely difficult under present conditions. An analysis of the underlying problems of increasing industrial production, financing raw material imports, replenishing working capital, and finding markets for the increased volume of export manufactures indicates that the attainment of economic self-support will probably not be possible before 1953, and the balance of payments envisaged for 1953 involves a level of living considerably below the prewar. Continued economic assistance from the United States will be necessary for several years, and it is essential that this aid include funds for recovery purposes as well as for relief items such as food and fertilizer. Such aid is indispensable if the production-export cycle is to receive the impetus necessary to move the Japanese economy off "dead center" so trade can reach a level where Japan will be able to pay for the imports which she requires. Failure to achieve the economic and trade recovery needed to support a tolerable level of living would provide the subversive elements in Japan—of the extreme left and the extreme right—with a rich opportunity to gain strength and jeopardize the prospects for a successful occupation. The success or failure of the occupation effort in Japan is of such importance in the ideological struggle against communism in Asia that American assistance in stimulating economic recovery and the attainment of a self-supporting status appears to be eminently desirable regardless of opinions concerning the strategic value of Japan in a possible war with Russia. Not only is economic recovery and self-sufficiency essential to the material well-being and self-respect of the Japanese people, but it is also the only acceptable method for ending the present anomalous situation in which American taxpayers are spending approximately $400,000,000 a year in relief appropriations for Japan.

Japan's dependence upon imported foodstuffs highlights the urgent need for wise action to invigorate and enlarge her foreign trade. While this course offers the main hope for solving Japan's economic problems, the expansion of trade is now confronted with such grave difficulties that it is advisable to direct attention also upon measures which will lessen the magnitude of the foreign trade problem by enabling Japan to balance exports at a lower level if necessary. Food and population are the critical elements in any measures to lessen Japan's dependence upon the success of her efforts to expand foreign trade. An increase in indigenous food production and a reduction in the rate of population increase would permit the attainment of a fairly adequate standard of living at a lower level of foreign trade, and thus make Japan less vulnerable if she fails to achieve a satisfactory trade recovery. Measures to increase the production of home-grown food are already receiving a high priority, and ambitious programs to reclaim land for agriculture and to improve land now under cultivation by irrigation and drainage are in progress. On the basis of present projections of population growth the effect of these programs to expand food production would, however, be nullified completely by the increased number of mouths to be fed.

To a limited extent knowledge of birth control already exists and is being practiced in Japan, and a few groups are actively concerned with the question. The majority of people, however, appear to be either unwilling to face the problem or unaware of the questions of public policy involved in the dissemination of information on birth control methods. There is considerable speculation in the Japanese press about the possibility of relieving Japan's population by migration, whereas the question of birth control receives comparatively little attention.[4] The discussion of migration almost appears to be a smoke screen to divert attention from the more realistic possibilities which exist in the wider application of birth control. A realistic appraisal of the present world political situation indicates that at the present time the prospects for large scale migration of population from Japan are negligible. The prospects were not good ten or fifteen years ago, and the hostility engendered in other countries of the Far East by Japan's military

[4] The establishment of a Japanese population research institute and Dr. Warren Thompson's recent visit to Japan give promise of increasing attention to the problem of birth control.

conquests makes it most unlikely that any of the sparsely populated areas will open their doors to Japanese migration in the foreseeable future. Furthermore, there is considerable question whether, in the short term at least, migration would really improve Japan's economic condition. Large-scale migration, if possible at all, would have to be to an undeveloped region such as the outlying portions of Indonesia or New Guinea. Experience has demonstrated that economic expansion in such undeveloped areas is not practical unless it is accompanied by heavy capital investment. Such investment would have to be at the expense of deferring current consumption in Japan at a time when her national income can ill afford the diversion of capital to such a long-range project.

The hard economic facts which point to the need for a wider application of birth control in Japan are unmistakably clear. The economic and social problems which would result from an unmanageable population problem would be so serious that action to lessen the magnitude of the problem should not be delayed. Much effort is being devoted by SCAP and the Japanese Government to problems of improving public health. The progressive and well-devised programs being carried out in that field will unquestionably result in a further lowering of the death rate. It would seem that the time has come for a parallel effort to spread the knowledge of the techniques of birth control so that human control over the birth rate can keep pace with the increasing effectiveness of the control of death. The means are at hand to accelerate greatly the dissemination of information. Public health clinics have been established recently in each of the forty-six prefectures of Japan, and it would appear that these clinics could be used to good advantage in spreading accurate information concerning methods of birth control. The Japanese Government is now engaged in establishing an enlarged agricultural extension program to provide farmers with the latest information concerning farm practices and other technical matters. In view of the seriousness of the problem of over-population in Japan's crowded farming communities, it would seem that utilization of the extension agents to promote a better understanding of birth control would make a major contribution to the solution of one of the most pressing problems of Japan's rural economy.

It is to be taken for granted that a wider practice of birth control eventually will follow in the wake of industrialization and urbanization in Japan as it has in the countries of Western Europe and in

the United States. The rapidity with which this trend will make itself felt is, however, a highly important variable which can be influenced significantly by action to encourage the practice of birth control. Unquestionably positive action in this field will be opposed vigorously by various groups in Japan and in the United States. General MacArthur has already received a protest from the Catholic Church in America regarding a statement by a SCAP spokesman which was construed as an indirect endorsement for the need for birth control. More recently the attitude has been expressed that SCAP should not concern itself with this issue since it is a purely Japanese problem. That would be a very convenient and unobjectionable position, were it not for the likelihood that for SCAP to ignore the problem is tantamount to taking a stand against birth control. As SCAP and the Japanese Government grapple with the problems of internal economic stability and the expansion of trade, it is also of great importance for them to face squarely the problem of population growth and to encourage measures which will facilitate dissemination of knowledge of birth control methods.

BASIC ECONOMIC AND WELFARE ASPECTS OF FARM TECHNOLOGICAL ADVANCE*

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TECHNOLOGICAL change is one of the more important dynamic forces affecting the structure and income of agriculture and its role in the national economy. Numerous studies have dealt either directly or indirectly with this phenomenon. This paper is designed to add to the general literature on the subject, both as a refinement of points analyzed elsewhere and as an examination of certain neglected welfare and progress considerations.

Society has assumed a major role in furthering technological advance in agriculture. In contrast to other primary (and secondary and tertiary) industries, socialized services make up an important portion of the total quantity directed at uncovering innovations and speeding their adoption. There is an important economic basis for public financing of farm improvements (and equally those of other primary or subsistence industries.) Progress and welfare criteria suggest, however, that the responsibilities of society do not end with the unveiling of an heretofore unknown production function and its extension to farms. Positive steps have been taken to safeguard against monopoly control of innovations (a common case for the private patents of other industries). Yet if public sponsorship of farm technological advance is to have its roots in general economic progress, the responsibilities of society transcend this single measure to insure an efficient use of those resources over which innovations give a greater command.

Role of Farm Technological Advance in Economic Progress

As a primary industry agriculture possesses characteristics which qualify it for prior consideration in improvement of techniques. Wealthy societies are characterized not by how many but by how few resources are invested in primary industries (the basic materials from which consumer goods are ultimately fashioned). The fewer resources necessary here the more which are available for secondary

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(fashioning raw materials into consumption goods—especially in extending the degree of quality and luxury embodied) and tertiary industries (personal services and other activities which produce a non-material output). Progress is represented not by an economy with 95 percent of its resources tied up in primary production but rather by the opposite. Not only is the logic apparent but also empirical studies provide quantitative verification of the relationship.[1]

In the same vein, agriculture as a source of subsistence goods qualifies for public investment in technology prior to luxury goods industries. Only after the basic requirements of subsistence goods have been met is the vista of the consumer opened for full exploitation of the utilities to be derived from non-subsistence or luxury goods which in modern times indicate a wealthy society. Again, economic progress is marked by a paucity of resources invested in subsistence goods production. The fewer resources required here, the more which are available for production of various ranges of luxury or non-subsistence goods.[2]

The small scale of the firm in agriculture perhaps provides an additional basis for public sponsorship of farm technological advance.[3] Individual farmers do not have funds for organizing research on a scale which will insure a high probability of discovery. However, society presumably has some goal such as higher farm income or general progress as a basis for its prior investments in technological advance in agriculture (as compared to other small-scale industries which are numerous).

Nature of Advance

Technological improvement has two general properties. The first, development of a new production function such that a greater output of product is forthcoming from a given total input of resources,

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[1] Cf. Colin Clark, *Conditions of Economic Progress*, MacMillan, London, 1940.

[2] Obviously, the difference between subsistence and luxury goods is one of degree. See K. E. Boulding (*Wealth and Income*, Canadian Journal of Economics and Political Science, Feb. 1939, and *Economic Analysis and Agricultural Policy*, Canadian Journal of Economics and Political Science, Aug. 1947) for a discussion of order among goods.

[3] Had not research and education in agriculture been partly socialized, private research and extension work (salesmanship) would undoubtedly have developed to a greater extent. There are many obvious examples in hybrid seed corn, machinery and elsewhere. However, the spread of findings is undoubtedly greater than would have held without public investment (and under the patent system).

is illustrated in figure I.[4] A corollary of this universal proposition is that technological improvement must momentarily increase the profits (or decrease the losses) of the firm.[5] The firm would never adopt an innovation were not output increased from given resources or conversely, input decreased for a given output. (This is to say,

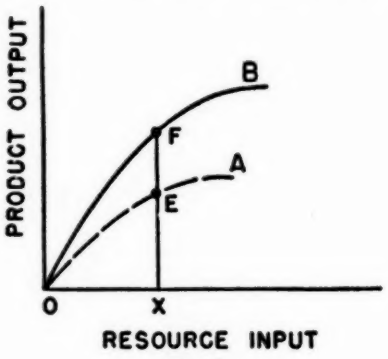

FIG. 1

the firm's cost curve must be lowered.) The only exception would be the case in which the innovation increased *ex ante* profit expectations through uncertainty or risk reduction. Even here the long-run and aggregate effect is likely of an output-increasing nature.[6]

[4] Production function B represents technological advance as compared to A since with an input of resources of (say) OX, output is OF and OE respectively.

[5] This does not mean that individual firms are always in an improved economic position after all or a large number have adopted the improvement. All can be worse off yet failure to adopt the technique by an individual would diminish his profits even more.

[6] Development of production function A after B is already known could not be considered technological advance where the transformation coefficients (rate at which resources are transformed into product) are known with (or near) certainty. However, it would qualify as an improvement under the situation where uncertainty is reduced and hence the value of anticipated returns is increased. The transformation coefficient in agriculture is seldom known with certainty for a single production period even though the parameters of the distribution (mode, mean, range, variance) can sometimes be established mathematically over a number of years. Accordingly, production function A might be considered as an improvement over B when the variability of and uncertainty surrounding the former is less than for the latter. As an overly-simplified example, one point on the production function B might represent a resource combination (OX) which gives a mean yield of 20 bushels but with probabilities of .1, .2, .2, .1, .1, .1, .1 and .1 respectively among the individual yields of 0, 5, 10, 15, 25, 30, 40 and 60 respectively while a corresponding point on A represents a mean yield of 18 bushels but with probability values of .2, .6 and .2 for the individual yields of 16, 18 and 20 bushels. Although the *ex poste* profits may be greater for B the *ex ante* returns may well be greater for A in the sense that profit expectations are discounted in terms of the degree of uncertainty. Adoption of A over B will be the case especially for the operator who is short on capital

Distinction between technological improvements which are output-increasing and factor-saving may apply to an individual industry or firm but it does not exist on an economy-wide basis. The basic nature of technological improvement is always the same in the economy as a whole. Aside from the uncertainty exception noted elsewhere, all technological improvements are output-increasing (from given resources) or conversely, (cost) input-decreasing (for a given output). An innovation is always output-increasing in the aggregate since although it may result in the same output from a smaller resource input by a given firm or industry, it frees resources for output expansion in other industries. In this sense all innovations stand to extend economic progress regardless of the industry to which they apply.[7]

Various characteristics can be used in classifying specific innovations. Some are outlined in following sections for use in later analyses. These are intra-industry classifications. They suggest possible outcomes for the agricultural industry, or segments of it such as geographic regions, or a sub-industry such as wheat.

Biological and Mechanical Innovations

From a purely physical standpoint, farm innovations can be classified as biological or mechanical. By the term "biological" we will refer to those which have a physiological effect in increasing the total output (per acre, animal, unit of feed) from a given land base. The term "mechanical" refers to innovations as a machine which

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or whose equity is so low that one or a few sustained losses may put him out of business. Technique A would seldom represent an improvement over B to a society which might insure a constant flow of commodity to consumers through a storage program (wherein the costs are sufficiently low to allow an economic carryover from bumper to failure years).

Even then, production function A might result in a greater output of the specific product than B. With a high degree of uncertainty as to outcome in any one production period under the latter the firm might rationally equate discounted costs and returns at a point which would be short of the optimal *ex poste* or historical marginal cost and return. With the "lesser degree of uncertainty" attached to the outcome under A, the firm would not apply as great a subjective discount to return expectations and would often end up with a greater input of resources and output of product. Although the distinction is somewhat different, the innovation would still be output-increasing for the individual firm and product.

[7] Progress can be defined as an increase in ends relative to means. (Cf. K. E. Boulding,—*Economic Analysis*, Revised Edition. p. 647. Harper and Brothers, New York, 1948.) This paper is concerned with a particular aspect of progress—minimizing the quantity of resources necessary for the "required" output of subsistence goods or minimizing the input of resources for the flow of primary materials from the given stock of basic resources.

substitutes capital for labor but do not change the physiological outcome of the plants or animals to which it may apply. Many mechanical innovations also have a physiological effect in increasing timeliness of operations, soil structure or otherwise directly affect the plants or animals. For the sake of simplicity, techniques which have both effects are termed "biological-mechanical."

The immediate effect of biological innovations (as classified here) is one of increasing both total output and total costs (per acre or per farm or per aggregate of farms which retain production). Hybrid corn, fertilizer, improved rations and similar techniques result in a greater total output. However, they also increase total costs(even though costs per unit ordinarily decrease) since not only the original costs of rearing, cultivating and harvesting are incurred but also the added costs of seed, supplies and of harvesting and handling the greater output are included.[8] The first effect of mechanical innovations is one alone of reducing total costs. A biological-mechanical innovation may increase or decrease total costs depending upon whether the added expense associated with the harvesting and handling of the greater output is less than the reduction due to the engineering recombination of resources.

Revenue and Cost

Public sponsorship of technical advance was perhaps originally drafted as a specific policy to increase farm income. Many still view public research and extension education in this light. The manner in which net returns are affected by specific technological improvements depends, however, upon the (price) elasticity of demand for the specific product and the effect of the innovation on 1, the total output and 2, the total costs of production. Models of possible outcomes are illustrated by figures 2 and 3. The curves labeled R indicate total revenues from sale of various outputs. The inclining portion indicates a price elasticity of demand greater

[8] Those biological innovations which relate to livestock such as improved breeding, sanitation and nutrition may at first appear to lower costs alone since they allow a greater output with less feed and other resources. This may be true in the short-run. However, in the long-run the saving in feed allows and leads to a greater number of animals and output of livestock products. As the slack is taken up in feed and other resources saved, added resources in housing and labor are also necessary to handle the greater amount of animals and products. Otherwise, the effect is of the mechanical nature outlined here. Too, it should be remembered that the analysis here is in terms of the industry. Although some farms may produce the same livestock with less feed, as feed "saved" is used on increasing output on other farms, total industry costs may increase as total costs decline on some farms.

than unity (a greater output sells at a lower price per unit but brings a greater total revenue). The declining portion represents an elasticity of less than one (a larger output sells at a lower price and brings a smaller total revenue).

I. *Demand elastic; total output and total cost-increasing innovation.* An innovation which increases both total output and total costs to the industry is illustrated in figure 2. Distinction between innovations in respect to their effects on the cost in a single industry must

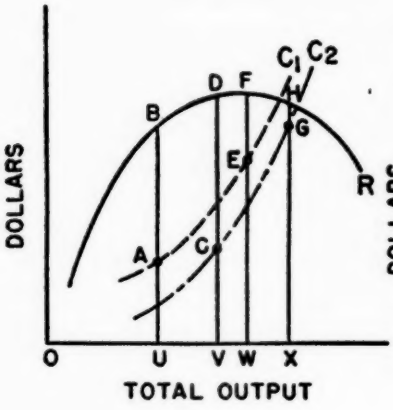

FIG. 2

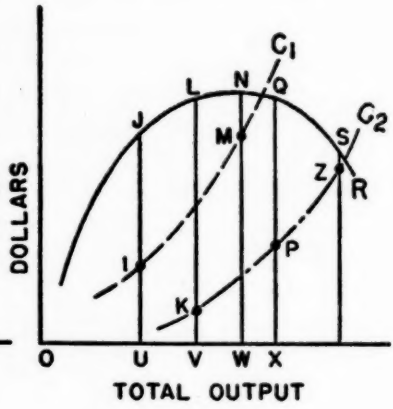

FIG. 3

be in terms of total costs. All innovations lower the per unit costs of production. Otherwise they would not be adopted (with the uncertainty exception already noted).

Net returns must increase if the increase in total revenue is greater than the increase in the total costs. This is illustrated by curves C_1 (figure 2) which represent the schedule of total costs for the old and C_2 for the new technique. Total output, total cost and total revenue previous to the innovation (C_1) are OU, UA and UB respectively. After the innovation (C_2) output increases to OV, costs to VC and revenue to VD. Net returns (AB) for the old technique are less than those (CD) for the new technique (since net = total revenue minus total cost).[9]

[9] Under competitive conditions costs will equal revenue for the industry. However, this is true only for the sum of explicit and implicit costs. The diagrams indicate only explicit or out-of-pocket costs. The net incomes AB and CD represent returns to unpaid operator and family labor, and capital and any "pure" profits. For a single firm maximum net profit is represented by that point which defines the greatest difference between the total revenue and cost curves. However, this need not be the point of equilibrium for cost and revenue curves representative of a competitive industry.

Presence of an elastic demand does not, however, guarantee an increase in net income. Net income will be decreased by an innovation which increases gross revenue but by a smaller absolute amount than the increase in total costs. Suppose that the pre-innovation output, costs and revenue are OU, UA and UB respectively (figure 2). A biological-type innovation which increases the corresponding items to OW, WE and WF will decrease net income from AB to EF.

II. *Demand inelastic: total output and total cost-increasing innovation.* Under this combination, net revenue of the industry must always decrease. Diminution of gross revenue always accompanies an increase in output where demand is inelastic. The greater costs reduce net return even further. This is illustrated in figure 2 where EF, the net income before the improved technique (C_1) is greater than GH, the net return after the increase in total output and cost (C_2). Only biological-type innovations fall within the situations outlined under I and II.

III. *Demand elastic; total output constant and total cost-decreasing innovation.* Net revenue must always increase since gross revenue is unchanged while total costs decrease.

IV. *Demand inelastic; total output constant and total cost-decreasing.* Net revenue must always increase for the exact reasons outlined under III. Innovations of the pure mechanical type fall under the number III and IV categories.

V. *Demand elastic; total output-increasing and total cost-decreasing.* This combination must always result in a greater net income to the industry since total revenue increases while total costs decrease. This situation is illustrated in figure 3 where the net return (KL) under the new technique (C_2) is greater than the net return (IJ) under the old technique (C_1).

VI. *Demand inelastic; total output-increasing and total cost-decreasing innovation.* Two possible outcomes are possible here. Total revenue must be less. If the decrease in total revenue is greater than the decrease in total cost, net revenue will also decrease as is illustrated by figure 3: The net return (MN) under an old technique (C_1) is greater than that (ZS) under a new technique (C_2). However, if the reduction in total revenue is less than the decrement in total costs net revenue must increase. This possibility is also illustrated by figure 3. Net income will increase from MN under an old technique (C_1) to PQ under a new technique (C_2) since the reduction in total revenue (from WN to XQ) is less than

the decrease in costs (from WM to XP). Biological-mechanical innovations result in the outcomes outlined under V and VI.

All innovations extend progress. However, specific innovations may or may not increase the income of the agricultural industry. The final outcome depends on the combination of forces outlined. In final equilibrium all individual firms may have smaller net incomes than in a pre-innovation period, but failure to adopt the

TABLE 1. PRODUCTION COSTS AND INDEX OF FARM OUTPUT FOR SPECIFIED PERIODS

	Index of farm output[10] 1935–39=100	Production costs (1910–14 dollars)[11]	
		Million dollars	Index 1935–39=100
1910–14	79.4	2,360	80.1
1915–19	85.4	2,272	77.1
1920–24	88.4	2,830	96.0
1925–29	95.8	3,208	108.8
1930–34	94.4	2,957	100.3
1935–39	100.0	2,949	100.0
1940–44	121.4	3,762	127.6
1945–46	131.0	4,545	154.1

technique would result in an even greater diminution in returns. Or, individual firms remaining in a segment of the industry (as for example, cotton producers) may have as great or a greater income but the industry may have a smaller net return because of fewer firms. Finally, it should be recognized that even though the long-run and aggregate effect of an innovation may be to reduce net income to all farmers, the few farmers who first adopt the technique will have greater income (until the number adopting be-

[10] Figure for 1919–46 from *Agricultural Statistics* 1946 and 1947. Figures for 1910–18 estimated by the writer.

[11] Based on data from *Agricultural Statistics* 1946 and 1947, and BAE Processed Report, *Net Farm Income and Parity Report*, 1943. Includes all production expenses of farm operators and landlords except taxes and mortgage interest payments. Does not include charge against land, capital or operator or family labor. Also feed and livestock have not been included since these represent purchases within agriculture. This system perhaps excludes 5–10 percent of total production costs to farm operators and landlords. Farm wage payments are included. Absolute quantities have been adjusted to a 1910–14 wholesale price base (in attempt to correct for value of the dollar). Unadjusted figures indicate, of course, an even greater increase in costs. Unadjusted costs were greater during the 1930's than for the period prior to World War I. Even in the absence of technical change, costs would be increased under favorable cost/price situations. However, the 1930–39 period was certainly less favorable to the use of additional resources in the absence of new techniques than the period 1910–24.

comes great enough to lower prices sufficiently to decrease incomes). Or, as is brought out at a later point, some farmers may end up with a larger income although net returns to the industry decrease.

Innovations of the various types have taken place side by side. However, available evidence indicates that aggregate farm technological advance has been of an output-increasing and likely of a total cost-increasing nature (the number II model outlined above). At the minimum, costs have not decreased. Demand analysis

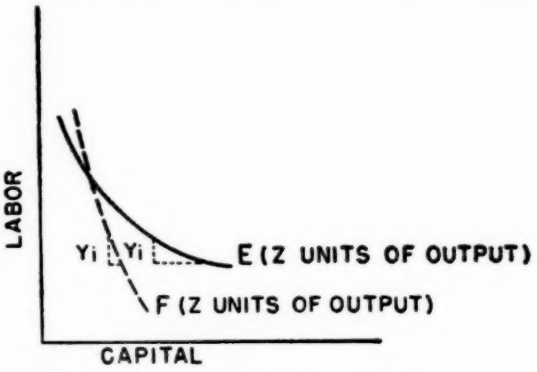

FIG. 4

suggests an aggregate elasticity of demand for farm products far less than 1.0 (under a given demand situation, the greater the total production the smaller the total revenue).[12] Although other economic forces bring about increases in demand and income, aggregate technological advance per se, if it falls under model II, results in a revenue lower than would otherwise hold under given demand situation.

Productivity of Specific Resources

Changes in value productivity of specific resources such as land, labor and capital may differ widely irrespective of the income-

[12] Cochrane has arrived at an aggregate price elasticity of −.41 for food products ("Farm Price Gyrations—An Aggregate Hypothesis," *Journal of Farm Economics*, May, 1947). G. S. Shepherd of Iowa State College (unpublished data) has arrived at a similar figure. For any elasticity of less than −1.0, an increase in output must be accompanied by a decrease in revenue since an increase of (say) 1.0 percent in output will result in a price decline by more than 1.0 percent. Johnson ("Econometric Models and Agricultural Policy," *Journal of Farm Economics*, February 1948) and Haavelmo ("Quantitative Research in Agricultural Economics," *Journal of Farm Economics*, November 1947) also provide data indicating an elasticity of around −.5.

effect of innovations (whether net income is increased or decreased). An important consideration here is the effect of new techniques upon the elasticity of substitution of resources (the marginal rates of physical substitution). The second universal property of innovations in agriculture is this: The marginal physical rates of substitution (the elasticity of substitution) are always altered in favor of one factor by specific innovations (the entire production surface is changed). This property is illustrated geometrically by the iso-product (equal product) contour of figure 4. For a given output of product (say 100 bushels of wheat or 100 pounds of pork) the iso-product line representative of a new technique (F) will always have a greater slope in the direction of one factor than under an old technique (E). The position of new contour must be partially or entirely lower (to the left) than the old. (One which falls entirely to the right would indicate a greater input of all factors for a given output and thus would not coincide with our first general property of innovation.) Thus a smaller quantity of one factor such as "capital" will be necessary to replace a given quantity of another factor such as "labor" after as compared to before the innovation (in terms of a given product output).[13] This characteristic is obvious for engineering innovations in which machines substitute for labor. It is not so apparent for biological improvements such as hybrid corn. Yet the basic relationship is the same.[14]

The marginal physical productivities may be changed in "favor"

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[13] In the example illustrated, the elasticity of substitution has been increased in favor of "capital" as is indicated by the greater slope of contour E. Under the old technique, 4X of "capital" was necessary to substitute for the Y_1 unit of "labor" while only X is required under the new technique. The marginal physical and value productivity of "capital" has been increased relative to that of "labor."

[14] Prior to the advent of hybrid corn, for example, a given quantity (or increment in output) of corn might have been forthcoming by cultivating fewer acres with more intensive applications of labor and capital on the remaining area (substitution of labor and capital for land). The hybrid seed itself and the greater input of "non-land" resources used in harvesting it represent added resources for a given acreage but a smaller total quantity of labor and capital applied in intensive cultivation on the remainder would be necessary to substitute for additional land which might be employed in producing a given output. The number of innovations which might possibly fall outside of this classification are unimportant in number and effect. Although specific techniques may appear to so qualify, closer scrutiny places them within the proposition. For example, it may appear that this would be true for a crop which is planted at a more favorable time period with the consequence that a greater product is forthcoming from the same input of labor, capital and land. While the increased output will be from the same land resources, additional capital will be required however, for harvesting and processing even within agriculture. Accordingly, the previous output can now be produced from less land and more labor and capital. The innovation again alters the marginal physical rates of substitution.

of land, labor or capital depending upon the specific innovation. For purposes of later references we will define "labor-substituting" innovations as those for which the elasticity of (physical) substitution has been changed in favor of labor. Similarly, we may have "capital-substituting" and "land-substituting" innovations.

For pure mechanical-type innovations (change in factor combination without an increase in output) value productivities will be changed in the same direction as (physical) substitution elasticities. Thus a capital-substituting technique would lower the value productivity of labor and raise that of capital. However, even though the mechanical-type innovation has no biological effect it may have an economic effect in increasing output. If costs are lowered sufficiently, equation of marginal costs and marginal returns in the post-innovation period may still call for an increase in output. Then whether or not the value productivity of (say) labor is decreased or increased will also depend on the elasticity of demand for the product (and whether net return is increased or decreased). If output is expanded, "labor" and "capital" may serve either as substitutes or cooperants.[15] The value productivity (in absolute terms) of "labor" for example, will increase only if the two factors serve as cooperants. They will act as cooperants (the value productivity of "labor" will be increased) only if the elasticity of demand for the final product is sufficiently greater than the elasticity of substitution of "capital" for "labor" (under the innovation). The value productivity of labor would always be lower under an inelastic demand.

A similar situation holds for biological and biological-mechanical innovations. Under those situations where net income is increased the various factors may again serve as cooperants (if the elasticity of demand for the final product is sufficiently greater than the elasticity of factor substitution) with a corresponding increase in value productivities. Even though net returns are increased, the value productivity of (say) "labor" may be decreased, however, if the (new) elasticity of substitution of "capital" for "labor" is sufficiently greater than the demand elasticity of the final product. A decreased net return must obviously result in a lower value productivity for part or all of the resources, depending upon the extent to which

[15] They will be (a) substitutes if the greater output is forthcoming with more capital and less labor and (b) cooperants if the increase in output is accompanied by a use of both more capital and labor.

the innovation alters the elasticities of factor substitution. For later reference, we will define labor-saving, labor-neutral and labor-using innovations, for example, as those which decrease, leave unchanged or increase respectively the value productivity of (returns to) labor.[16] The same definitions will apply to capital and land. An innovation might thus be capital-using and both labor and land-saving.

Finally, we will define an innovation as land-embodying and capital and labor-rejecting (and vice versa) where the combined effect of the innovation on the elasticities of substitution and value productivities is such as to result in a given output of product with a greater proportion of land and a smaller proportion of capital and labor (the absolute quantity of land embodied in the product may be either greater or smaller but the proportion must always be greater).[17] An innovation may be land-embodying even though it is land-saving in terms of lowering returns or value productivity of land to the extent that the same technique is "saving" for both capital and labor and drives them to other industries (because of the lowered returns) and the final burden of lower returns is expressed in lower rents.

Aggregate technological advance over the last three decades has evidently been in a land-embodying direction. A greater product has been forthcoming with some increase in land and a decline in labor input. Also up to World War II a greater product was possible

[16] Lange, Oscar, "A Note on Innovations," *Review of Economic Studies*, Vol. XXV, 1943, We are interested here only to the extent that value productivities are increased or decreased in an absolute sense. This is in contrast to the use of these terms by Hicks (*Theory of Wages*, London, 1932, pp. 121–122) and Piqou (*The Economics of Welfare*, London, 1938, pp. 674–675) to indicate relative factor shares.

[17] An example of a land-embodying innovation has been the development in wheat production especially. As the location of wheat production moved from New England to the Great Plains States a given quantity of output has come to be produced with more acres of land but with less labor generally and often with less total capital. A similar development has taken place the world over in several decades as new areas have shifted to wheat. Mechanization of cotton production may have a similar land-using and capital and labor-saving effect once it comes into full play. It is entirely possible that cotton production will spread over more acres (especially in replacing much of cropland now devoted to mule feed) while using a smaller total quantity of labor and capital. Were chemical sprays to substitute completely for cultivators in corn production, it is possible that this single innovation might be of a land-embodying (labor and capital-rejecting and labor and capital-saving) nature. The major change in capital relates to rate of transformation into product. A smaller non-real estate capital indicates a smaller investment in capital which is transformed only over many production seasons (with depreciation as the portion transformed or the expense within one production period). A greater production expense in the face of a declining use of labor then indicate a greater input of capital which is transformed in one or a few production periods such as fertilizer, tractor fuel and similar items which are termed operating expenses in accounting.

with a relatively constant (non-liquid and non-real estate) capital input. The change in capital has been more in form than in total quantity. The change in form of capital created by innovations perhaps promises to increase the substitutability over time of land for both capital and labor in producing equal outputs of food and fiber.

TABLE 2. TOTAL EMPLOYMENT OF LABOR, LAND AND WORKING CAPITAL FOR SPECIFIED YEARS

	Average farm employment[18] (thousands)	Acres of land in farms[19] (millions)	Total non-real estate capital (millions of dollars)	
			Unadjusted[20]	Adjusted[21]
1910	12,146	879	7,160	7,042
1915	11,981	—	8,872	7,227
1920	11,362	956	14,011	7,459
1925	11,448	924	8,841	6,382
1930	11,173	987	10,498	7,440
1935	11,131	1,055	5,879	4,326
1940	10,585	1,061	8,468	6,277
1945	9,844	1,142	17,094	9,315

Income Transfers

New techniques may transfer income and wealth between individuals regardless of whether total net farm income is increased or decreased. The transfer may be of an intra-industry nature in the sense that it increases the income of some people in agriculture at the expense of other people within the industry. Income will be transferred when the techniques for one commodity or geographic region are improved beyond that which applies for a competing commodity or region.[22] This situation can hold regardless of the elasticity of demand as is illustrated by Table 3. In the period 1937–46, for example, corn yields were greater by 45.8 percent in Grundy County but by only 6.8 percent in Wayne County, Iowa as compared to the pre-hybrid era, 1920–29. A decline in price by

[18] BAE, "*Farm Wage Rates and Related Data*" (Washington: USDA, 1948).

[19] *Agricultural Statistics*, 1947.

[20] BAE "*Net Farm Income and Parity Report*," 1943 and *The Farm Income Situation* June–July, 1947.

[21] Based on "3" and individual capital items from *Agricultural Statistics* 1942 and 1947 adjusted to a 1910–14 price level or value of dollar base to suggest the physical volume.

[22] A somewhat similar type of transfer may also take place in this sense: The first few farmers who adopt an output-increasing technique will realize higher incomes even if the demand is inelastic since, in a competitive market, small changes in supply have small effect on price. However, as the majority adopt the innovation, the total outcome is smaller incomes (even though net income would be even less for the "following" were they not to adopt the new technique).

25 percent (because of the innovation and greater total output or for any other reason) would result in a greater total revenue per given acreage in the former and a smaller total revenue in the latter county. (The varying responses indicated in table 3 are not necessarily due to hybrids alone but the result is the same as long as innovations do not apply equally to areas or are not adopted at equal rates).

TABLE 3. YIELD PER ACRE OF CORN IN TWO PERIODS FOR SPECIFIED GEOGRAPHIC REGIONS[23]

Region	1920–29 Average	1937–46 Average	Percent Change
Wayne County, Iowa	34.0	36.3	+ 6.8
Switzerland County, Indiana	31.6	34.2	+ 8.2
Tipton County, Indiana	42.8	56.3	+31.5
Grundy County, Iowa	43.0	63.1	+45.8
State of Georgia	10.3	11.4	+10.7
State of Kansas	21.8	21.6	− .9
State of Pennsylvania	42.1	42.3	+ .5
State of Missouri	29.0	30.6	+ 5.5
State of Iowa	40.5	52.1	+29.0
State of Illinois	35.9	49.1	+36.8

A second possible transfer-effect is of an inter-economic unit nature. One group of individuals such as producers of farm products may lose in terms of dollar and real income as the consuming economy gains in real income. This type of transfer will hold where total output is increased and (price) elasticity of demand is less than unity (and if total costs remain constant or increase).

Innovations which have an income transfer-effect must also have an associated effect on the wealth of individuals. Asset values must change as the increment or decrement in income is capitalized into land and specialized capital resources. Once the capitalized value of assets has decreased the resource owner cannot transfer his pre-innovation wealth to other industries. However, the individual whose resource inventory has increased in value can transfer the greater post-innovation wealth if he chooses to do so.

Alternative Goals

The direction given farm technological advance might well differ depending upon the specific ends to be attained. Among others alternative goals toward which publicly sponsored technological

[23] Source *Agricultural Statistics* and Crop Reporting Statistics for the specified states.

improvement might be directed include 1, increasing the total net income of the agricultural industry 2, increasing the total utility or welfare of individuals now in the agricultural industry and 3, maximizing aggregate economic progress.[24] These alternative goals are not identical and without conflict. Attainment of a greater net farm income does not guarantee a greater total welfare of people now in agriculture. Total utility or welfare of a community of individuals is a function not only of the magnitude of the income but also of the distribution of this income. To the extent that increases in income are accompanied by a transfer of income, total utility will increase or decrease depending on whether the gain in utility to individuals with augmented income is greater or smaller than the loss in utility to those whose income is lessened. Similarly, improvements which lessen the gap in incomes in the face of a smaller total income may or may not increase total farm welfare depending on the nature of the inter-personal transfer of income. Attainment of economic progress (in the sense of minimizing resource inputs for the "necessary" output of subsistence food products) would generally exclude attainment of the other two objectives. Under the pricing system, a continuous depressing of net income and welfare to people in agriculture would be necessary to drive innovation-freed resources to other industries.

The outcome of resources invested in research on a specific commodity or innovation cannot be predicted with certainty. However, the probability of success along the line of any specific innovation (say, improvement in wheat as compared to soybeans) is dependent to a fairly large extent on the quantity of research resources marshalled in the specific area of investigation. Given this degree of control over discovery and adoption (through allocation of funds between and within agricultural experiment stations and extension services) society has the power to exert important influence over farm technological advance. What type of technical innovations might be extended were any single one of the above objectives to serve as the criterion in guiding technological improvement in agriculture?

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[24] Other goals might include (a) the greatest net income per farm and (b) increasing the income of farmers who first adopt new techniques. Obviously, these are partially compatible and partially conflicting with each other and with other goals outlined. Total economic welfare might represent still another goal and while partly allied with the total farm welfare or economic progress goals as defined here, it is not identical. Consideration of total economic welfare as it relates to the economic progress goal is made at a later point.

1. *Increasing the total net income of the agricultural industry.* Were this the goal of farm technological advance, price elasticity would serve as an important gauge in directing development and adoption of innovations. Total output and total cost-increasing (biological) innovations would be withheld where demands are inelastic and extended only for commodities with elastic demands (and then only as long as the increase in total revenue is greater than the increase in total cost). Output-constant and total cost-decreasing (mechanical) innovations would be extended for all commodities irrespective of demand elasticities. Total output-increasing and total cost-decreasing techniques (biological-mechanical) would be developed for all commodities with elastic demands but for those with inelastic demands only if the decrease in costs were greater than the decrease in revenue. Finally, if the goal of public investment in techniques were alone one of increasing or maximizing agricultural income, a large portion of effort would be focused not on discovering new production functions in agriculture but in increasing the (price) elasticity of demands for farm products. This would especially mean development of new industrial uses for farm products. Emphasis would be given to increasing the substitutability of basic farm materials for the materials of other industries. To the extent that this were accomplished, net income in the agricultural industry would be increased at the expense of income in other primary industries.[25]

2. *Maximizing or increasing the total welfare of individuals now in the agricultural industry.* Were increasing net farm income the single objective of public-financed technological improvement, no regard need be given the nature of the total utility function or the distribution of income. However, distribution of income is as important as magnitude of the income were maximizing the total welfare of people in agriculture to be taken as the goal. If all resulted in an increase in the magnitude of net farm income and

[25] A somewhat different avenue of attack would revolve around income elasticity. Here research funds would be invested not in farm technology or the farming industry per se but in research relating to segments of the economy entirely apart from agriculture. Special emphasis would be given to means of increasing the incomes of all low income persons in the economy (either by additions to a given national income or by transfer of a given national income between high and low income groups perhaps via the machinery of progressive taxation on the one hand and consumer subsidies in the form of food and clothing stamp plans on the other). It is known that income elasticity for farm products, especially food, is greatest for low income families. The market differences in prices and income between the 1930's and 1940's emphasize the greater efficiency of economic as compared to technological forces in augmenting net farm income.

none resulted in a transfer, the innovations outlined under 1 would also be applicable under 2. However, on the basis of the total farm welfare criterion, these improvements would not qualify were the increase in total income associated with an income redistribution such that the increment in utility to the "receiving" group is less than the decrement in utility to the "losing" group.

Progress towards the total farm welfare goal might be attained (at the expense of the total net farm income goal) by output and total cost-increasing innovations even where demand elasticity is less than unity provided these conditions hold: 1, the percentage increase in output is greater on low-income farms than (a.) the percentage decrease in price and (b.) the percentage increase in output on high-income farms; 2, the increment in utility associated with greater revenue on low-income farms is greater than the decrement in utility associated with the decrease in revenue on the high-income farms.[26] Special emphasis would be given to extending output-increasing techniques in low-income areas relative to other geographic areas (the innovation would be equally applicable to high-income farms in the area of course). For example, a greater quantity of society's funds might be spent on output-increasing techniques in southern Iowa than in central Illinois or in Alabama than in Indiana. Or if the producers of one commodity (A) were predominantly poor while the producers of a closely competing commodity (B) were predominantly wealthy, resources might be concentrated on innovations which improved the former relative to the latter product. Total farm welfare might thus be increased to the extent that the increment in utility to A producers were greater than the decrement in utility to B producers. The simple transfer would, however, represent a crude system of transferring income where some producers of A have high incomes while some producers of B have low incomes. Other techniques which would especially qualify under the "total farm welfare" criteria might be "engineering" or cost-reducing techniques which are adapted to farms with small quantities of resources.

3. *Maximum economic progress.* Given this goal of farm technological advance, a somewhat different set of innovations would be emphasized. Continuous progress toward this end would require both lower total farm returns and total welfare of people on farms

[26] Implicit in this statement is also the condition that the increase in revenue be greater than the increase in costs on low-income farms and that the reverse hold true on high-income farms.

in order that the pricing system might effect a transfer of resources to non-subsistence industries. In order that resources be driven out of agriculture, any increments in income from some innovations would have to be more than offset by decrements in income by other innovations. Output-increasing techniques would never be extended (except one category of biological-mechanical innovations) for commodities with inelastic demands under the total farm returns goal. Yet these are the very commodities which would be given heavy emphasis for the progress goal. The greater the price elasticity of demand the higher the commodity ordinarily (but not always) stands in the scale of luxuries. For the progress goal, luxury farm commodities with an elastic demand would have no greater priority on public-financed technological improvements than non-farm luxuries.

Maximum economic progress would be characterized by land-substituting (including reclamation of land) and land-embodying and never by capital-using and labor-using innovations. Aside from the small portion of total land area devoted to non-agricultural uses, land is not transferable to other industries.

Instability

Technological improvement which is founded on economic progress must result in continuous instability of subsistence or primary product industries. Resources must be in a constant flow out of these industries. Measured by the same criterion, the value productivity or returns on resources must be constantly lower than in other industries (to which surplus resources are being transferred). Progress becomes characterized by low returns on resources in agriculture (and other subsistence goods and primary products industries).[27] Higher resource returns in subsistence than in luxury goods industries represents retroversion rather than progress.[28]

[27] Dr. T. W. Schultz seems to express concern that technological advance has done nothing to increase the value productivity of farm resources (How Efficient is American Agriculture, *Journal of Farm Economics*, August 1947). However, if the goal of improved techniques in agriculture is taken as general progress then the low value productivity of resources marks positive accomplishment of farm innovations.

[28] Some might raise the point that technological progress must go hand-in-hand with increasing resource returns were population to increase, nutritional levels and demand to be raised etc. However, the criteria of economic progress still apply. Suppose that the original demand (need) is for y output of subsistence goods and that these can be produced in a pre-innovation period with x resources. In the absence of changes in demand (need) for subsistence goods, progress would be represented by development of techniques which would allow y output with less than x resources. Now suppose that population or nutritional standards double such that the demand (need) is 2y. However, it is still desirable, in terms of progress to produce

A progress goal of publicly financed farm technological advance must necessarily be one of increasing the physical product while decreasing the value of product per unit of resources in agriculture.

Welfare Criteria and Compensation

Economic reorganizations can be segregated into two categories depending on their effect upon the welfare of individuals. Specific reorganizations may either 1, increase the welfare of one person or group without diminishing the welfare of others or 2, increase the welfare of some individuals at the expense of others. Total economic welfare is always increased under the first. It increases under the second only if the increment in utility or satisfactions to the recipient group is greater than the decrement in utility to the sacrificing group. Since inter-personal utility comparisons are impossible, objective measurement of outcome under a transfer (the second category) is impossible. However, the impossibility of interpersonal utility comparisons does not exclude society's ability to fashion policies which it deems consistent with a greater total welfare.

Although inter-personal comparisons of utility are impossible, society has based policies on obvious differences in individual welfare. The poor are not taxed at a heavier rate than the rich, for example, in order that elementary education be furnished the latter. There are many other areas in which the order and direction of needed reorganization are clear. However, the nature of transfers in income which grow out of farm technological advance are not of an orderly fashion: consumers who realize gains in the form of more food for less money are not generally poor and farmers whose income may diminish are not universally wealthy. Similarly, producers of one commodity or region who gain from a specific improvement are not universally of the lower-income strata while others within agriculture who sacrifice as producers in a competing region or of a competing commodity are not universally of the high-income strata.

Perhaps at the outset social investment in farm technological advance was thought to fall under the category of *leaving some individuals better off without leaving any others worse off*. Present knowledge of demand elasticities questions any such unwitting assumption for agriculture as a whole and for a very great number of single products. The principles developed in modern welfare

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the 2y output not with 4x or even by x input of resources but by ½x or any smaller quantity. The level of technique would need to be stepped up even further to allow expansion of non-subsistence industries.

economics provide the basis for guaranteeing that total welfare can be increased even though the reorganization is in the form of transfers.[29] Lack of inter-personal utility comparisons excludes possibility of empirical evidence to indicate the utility of those gaining from a transfer is increased by more than the satisfactions of those sacrificing is decreased when there is no order in the reorganization. However, this difficulty can be removed by compensation to redress impaired income positions and guarantee that no person is "worse off."

A bulk of the agricultural policy legislation of the past two decades can be interpreted literally as society's belief that 1, farm income is less than would have been true had the capacity of agricultural resources not been increased so greatly by technological improvements and 2, compensation is in order to redress general impairment of the farm economic position which has grown out of increased output and technological advance. The provision for production control is prime evidence of the first (a smaller output to attain a greater revenue) while the cordon of subsidies designed to restore farm earnings at historical levels is material evidence of the second. Society has simply recognized that the greater flow of production growing out of its designed policy of improved farm technology has increased total welfare at the expense of returns to the farm population.

Although the action conforms with principles of modern welfare economics, a conflict must be recognized. If farmers are made as well off relatively in post-innovation as pre-innovation periods, forces will not be generated to drive the surplus resources to other industries. The apparent dilemma is not insoluble. Means exist both for redressing impaired farm returns and speeding the flow of resources to non-subsistence industries. Society has an ipso facto policy designed to bring about surplus resources in the farming industry. It should have an equally positive policy directed at speeding the movement of resources out of agriculture.

There are few precedents whereby society has provided full compensation to guarantee that all individuals are "as well off after as before" economic reorganizations. (Too, there is question as to whether the status of the past provides better criteria than the "possibilities of the future" as a benchmark from which reorgani-

[29] Cf. J. R. Hicks, "The Foundations of Welfare Economics," *Economic Journal*, Dec. 1939 and T. de Scitovsky, "A Note on Welfare Propositions in Economics," *Review of Economic Studies*, Nov. 1941.

zations might be fashioned.) Accordingly, it is questionable whether society should attempt, or whether a full scale, innovation-inspired program of compensation is feasible. Yet a minimum program of compensation is certainly in order. Society should provide the mechanism whereby those resources whose returns have been lowered can be moved into alternative opportunities where returns on resources are higher.

Barriers to Mobility

A positive policy is needed to catalyze the movement of surplus resources from agriculture. In fact here lies the crux of any economic policy which has the long-run dual objectives of increasing the income *per individual in agriculture* and of maximizing general economic progress.

But first the forces which serve as obstacles to mobility need be examined. These are numerous and most have economic roots.

1. *Lack of knowledge.* A large portion of individuals are so preoccupied in their micro-environment that they do not comprehend the macro or aggregate economic adjustments which are shaping their destiny. In spite of the "enlightening effect" of low incomes, many hold on with hopeful expectations that "things will improve" or "a solution will be forthcoming." Distinction is not made between short-run phenomena such as the business recession and long-run readjustments such as changes in techniques. Furthermore, the market is imperfect in the sense that knowledge of comparative returns is meager, first, for alternative products and regions within agriculture and second (and even more important), for use of resources in non-agricultural as compared to agricultural pursuits. Too few know "where to go" and the "level of income to be expected" were they to leave agriculture.

2. *Cost of transfer.* Movement between industries and geographic regions involves perhaps as many as three types of costs: (a) direct expense of migration (b) direct loss in income during the period of transfer and (c) loss of investment in resources impaired in value and made obsolete by the reorganization.[30]

3. *Risk and uncertainty of returns.* The uncertainty of returns on resources transferred from agriculture is mitigated by the

[30] A machine, for example, may be made obsolete to the extent that its market value is depreciated. Yet the farm owner may recoup as much of the original cost through use as was reflected in the original investment. The loss here comes about only in the market value of the asset. In highly depressed farming areas, this cost of transfer itself acts as an important obstacle to mobility.

business cycle. The feeling of greater security on the farm is ingrained in farm persons to an extent that many prefer a smaller return in agriculture to a higher mean (non-farm) income over time which may vary from zero (unemployment) to a level several times greater than farm expectations. The possibility that the period of low income or unemployment in industry may follow immediately after the shift augments the degree of uncertainty and returns discounting. Experience with moratorium laws perhaps provides the basis for farmer belief that the recession may be bridged in agriculture through these time-consuming processes. The opportunity for a greater inter-temporal transfer of income in agriculture also exists as the operator increases present at the expense of future income through soil exploitation and postponement of depreciation reserves.

4. *Inflexibility of human capacities.* Flexibility in human capacities wanes with the individual's life. It is greatest before initiation of technical schooling or apprentice training since the individual can, within the limits of his natural abilities and economic means, turn in any direction. However, once his career has been launched and his family responsibilities grow he is increasingly unable to take time out to acquire skills necessary for alternative economic opportunities. Even though his innate capacities, were they fully developed, provide the basis for greater returns in other lines, inability to capitalize on his abilities through new training may leave him in a position where returns are greatest in the old occupation even though these have been lowered. Another facet of this same problem is the lack of opportunity for investment in the human resource other than by the public or by the individual himself.

Innovation-Inspired Mobility Policy

Maintenance of a high and stable level of national income is, of course, a necessary condition for resource mobility. Only then can uncertainties which attend movement of human resources be minimized. Mobility policy should also meet two general tests: (a) It must not destroy freedom and choice of the individual in respect to type and place of employment. (b) It must increase the total economic product. Given these conditions and farm technological advance as an economic progress goal, the following are logical policy steps:[31]

[31] For other proposals along these lines see T. W. Schultz (Agriculture in An Unstable Economy, McGraw-Hill Book Company, Inc. 1945) and D. Gale Johnson

1. *Economic outlook for specific technical improvements.* Estimates of the economic impact (interproducts, interregional and inter-industry productivity and shifts of resources; effect on incomes) should be provided for each major innovation. These should be aggregate and forward analyses rather than indication alone of the immediate profitability to individual farmers.

2. *Nation-wide employment service.* A nation-wide employment service should supply information on the location, type and returns of employment. In this vein it would both aid in reducing the uncertainty which surrounds mobility and in channeling resources into opportunities where value productivities are greatest. The objective here, as for other policy elements outlined, is both one of increasing the individual welfare (compensation for impaired income) and the social product.

3. *Provisions for increasing the flexibility of human capacities.* Industrial employment training should be carried to individuals (already established in farming) in regions where the returns on resources have been lowered. A program of this nature would increase the value productivity of individuals above that which might be realized were they to migrate without acquiring new skills and training. Where the adjustment required is of great magnitude, some form of "training-compensation" might be in order were family finances not to be cut too severely in the interim of the training period. Another element of this program would be greater emphasis and broader education on industrial employment and non-farm opportunities in the secondary schools of agricultural areas. With technological advance as an economic progress goal (minimizing the resources in agriculture as a primary or subsistence good industry) this facet of education is equally as important as vocational agricultural training designed both to return young people to farming and extend techniques even further. Similarly, the agricultural extension education should focus on informing young people and established farmers about non-farm employment opportunities as well as on improving farm techniques.

4. *Payments and loans to underwrite the cost of transfer.* Compensation to owners of resources (in distressed areas) on which returns have been lowered as a result of technological change might include either direct payments or interest-free loans to defray the cost of

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(Contribution of Price Policy to the Income and Resource Problems in Agriculture, *Journal of Farm Economics*, Nov. 1944).

movement. Again, this step would not only facilitate movement of the individual to employment where returns on his resources would be greater but would also make for a greater national product.

The steps outlined do not necessarily provide for full compensation to individuals. For example, they include no payment to redress impaired value of capital assets such as land, buildings and machinery on which returns have been lowered or which have been made obsolete. They simply provide for minimum compensation consistent with public-financed technological improvement as an economic progress goal. If farm technological advance is to be justified in terms of general progress, it makes little sense to free resources and then leave them stranded even temporarily in agriculture. Compensation should focus, of course, on those resources where value productivities are lowered.

Additional Considerations

We have been unable to include many social aspects of technological improvement in one study. The analysis is entirely in economics. Even here we have unfolded only one of the many chapters which are possible. Some may suggest that the arguments put forth are in the agricultural fundamentalist vein. Quite the opposite is true: the analysis is in terms of minimizing (rather than maximizing per the fundamentalist) the input of resources for the "needed" output of subsistence goods.

The analysis might be termed "closed economy" although this objection is certainly removed in the sense that there is only one world economy and the conclusions apply equally on a world basis. Yet if one nation produces agricultural commodities to export and exchange for luxury commodities of other countries, the agricultural production in the first no longer falls in the subsistence category (too, the portion of agriculture as a luxury-exchange industry would have no prior claim over other luxury industries for public finance of innovations). Finally, agriculture might gain in real income (from innovations within agriculture) where innovations take place in the face of inelastic demands and lowered money income. This is true in countries where resources in non-agricultural industries are so few that luxury production can be organized on an "adequate" economy scale only by transfer of resources from agriculture. The case is a special instance of those discussed and would still require a diminution in value productivity (income) to some resources in agriculture.

ECA IN ACTION ON THE FOOD AND AGRICULTURE FRONT

OF all the interests of our government—political, financial, legislative, educational—there is not one which does not relate in greater or less degree to the progress of the European Recovery Program. Our realization of the inescapable bond between European and American affairs was implicit in the concept of the "Marshall Plan."

Agricultural economists, of course, are most interested in the progress of the Food and Agriculture Division of the Administration. Decisions concerning problems in the agricultural sector of our own economy are dependent on the outlook and plans for agriculture in the rest of the world.

Agriculture's importance in the scheme of European recovery is shown by the Ninth Report of the Economic Cooperation Administration.[1] Of the total $4566.7 million authorized through Feb. 28, 1949 for use by ERA, $2157.3 million or 47.2 percent of the total was for food and agriculture commodities, including agricultural machinery. This report also gives the following breakdown of the food and agriculture expenditures:

Commodity	Authorization (millions)
Bread grains	$813.9
Cotton	358.6
Fats and Oils	225.8
Coarse Grains and Feed	157.8
Tobacco	120.0
Sugar and Related Products	106.8
Meat	79.0
Dairy Products	73.1
Fertilizer	33.3
Miscellaneous	119.8
Agricultural machinery, exclusive of tractors	38.4
Tractors (under 50 H.P.)	30.8

Even more significant and stimulating than these figures, however, are the stories behind the figures. What is the ECA agricultural program actually accomplishing in the cooperating countries? Are the adjustments in agricultural production in line with long

[1] Ninth Report for the Public Advisory Board, Economic Cooperation Administration.

time needs? What are the key agricultural problems and trends in these countries?

We know of no better source for such supplementary information than first hand accounts from the agricultural attaches and the heads of the agriculture divisions of the special ECA mission to each of the cooperating countries.[2]

The ECA story, of course, is different for each country, because each has its peculiar problems and its prospective solutions to those problems. But threads of continuity run through the reports from each of the countries; things which remind us that many of these agricultural problems are basic, not isolated nor belonging to only one country. There is the universal striving for increased production; the need for more machines and better methods; extension services that really reach the farmer; the necessity to restore trade, to balance imports by exports—these problems are the same for all.

Food imports have required most of the ECA funds allocated for food and agriculture in the first year of the Program's operation. But reorganization plans for agriculture are basic to the long term plan for achieving financial independence in most countries by 1952 when the Program is scheduled to end. In the later years of the program an increasing proportion of ECA funds are scheduled for machinery, fertilizers and other materials to boost agricultural production. As one reads the reports from the individual countries it is evident that the ECA program, in addition to its financial help, already has furnished the stimulus for a critical appraisal and drafting of long time plans for agriculture. There is little evidence as yet of integrated planning for the agriculture of adjoining countries (except for the Benelux Economic Union). Perhaps that will come later.

From England, the former citadel of free trade, we get reports of plans to increase home food production above the high wartime levels, utilizing economic incentives, government subsidies, and other government programs as a means of self defense in a chaotic economic world. France, with its traditional independent farmers and inefficient strip system of farming in many areas, is developing bold plans for a more efficient and larger agricultural production.

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[2] Many of these men are members of our Association. They have generously cooperated with a special request from the editorial office by sending in brief on-the-spot accounts of ECA's program and problems in the food and agriculture field. These reports form the basis for this article.

Italy, with its pressure of population, is going forward with irrigation projects, introduction of hybrid seed corn, improvement of dry land farming and other plans both to increase the food supply and provide more employment on farms.

Bizonal Germany is faced with a shift from traditional livestock farming to the continued production of direct food crops. The reduction in livestock farming can be minimized if exports can be expanded to provide continued imports of feed stuffs. The lack of an effective extension service to take the leadership in an agricultural adjustment program in Germany comes as a surprise in view of the years of state planning in that country.

Denmark, Norway, Belgium and Luxembourg, with efficient farming systems before the war, need help to recover from the war, an opportunity to sell goods in world markets, and an accelerated rate of mechanization to make up for the time lost during the war years.

Austria suffers many of the same problems encountered in Bizonal Germany. Turkey presents an unusual situation in that here the urge for improvement in agriculture is not to reduce needed food imports. Long time plans for agriculture in Turkey are to build up an already important exporting industry.

The country by country reports follow:

The United Kingdom[3]

What ECA is accomplishing in the food and agriculture field in the United Kingdom is, of course, necessarily related to what is happening in the whole economy. Except for a year or two here and there, not since 1820 has the United Kingdom produced and sold as much to foreign countries as she bought from them. The "invisible" income which always made up the difference—shipping, insurance, foreign investments and the like—suffered disastrously during the long years of the war. While the British are staging a comeback on many of the "invisibles," readjusting for the major contribution made by foreign investments—frequently as much as 20 percent of total imports—is a painful process. Hence the big gap in Britain's balance of payments. To help reduce imports, agriculture is called upon to produce more at home.

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[3] Based on a report from E. N. Holmgreen and Paul Nyhus, ECA Mission to the United Kingdom, London; Report of the ECA Mission to the United Kingdom, Dec. 31, 1948, Volumes I and II.

The program calls for raising agricultural production 50 percent above prewar and 15 percent above the wartime peak. By 1952 Britain wants to reach approximately the following targets compared to 1936–38:

Commodity	Percent Increase
Grain	85
Milk	23
Eggs	31
Beef and Veal	10
Mutton and Lamb	−15
Pork	− 8
Overall	50

Overall agricultural output for 1948 is estimated at 130 percent of prewar.

The expansion program will involve the cultivation of about six million acres in grassland and the improvement of some two and a half million additional acres by drainage. Grasslands being converted to crop raising will have yields generally as high as the land presently under cultivation.

Further progress in the mechanization of British farms plays an important part in the overall program. British farms are already more highly mechanized than the average farm in the United States, and the farm machinery and equipment industry at the end of 1948 was producing at seven times its prewar rate, so the outlook is favorable.

Other aspects of the food and agriculture program include a further 20 percent increase in the use of fertilizer—already double the prewar consumption; improved farm credit facilities; and expanded research and educational projects.

Capital investment required to modernize and mechanize the existing plant and expand to the goals established is equivalent to about $1.8 billion. This is only three and one-half times the value of the annual return in decreased imports, so the program will pay for itself quickly in terms of foreign exchange savings.

What is ECA's contribution to this program? It is, first, financing about 13 percent of British food and agricultural imports—that part of the imports which must come from dollar areas and which is beyond the dollar resources of the United Kingdom without assistance. This enables the United Kingdom to maintain a monotonous diet about two percent lower in calorie content than prewar. Cereals and dairy products are the major food imports

financed by ECA funds. Food alone comprised approximately 46 percent of ECA imports into the United Kingdom from April 3 to October 15, 1948, and is estimated at 33 percent of the total in 1948–49.

A second important specific contribution of ECA to the food and agriculture program is its financing of certain types of agricultural machinery and spare parts from dollar sources. This machinery is of a kind and type not made in Britain. Except for extra heavy tractors and a few other items, the British are rapidly increasing production of the machinery needed to supply their own requirements.

Some of the longer run questions and problems are: Is Britain turning her back on her old policy of being an industrial nation and buying foods in the cheapest world market? Is Britain overlooking the whole principle of comparative advantage? The answer to both questions is a weak and modified "yes." In the language of the report, "Unfortunately at the moment, food is not purchased with 'principles' of any kind; it takes dollars, pesos, francs, lire, kroner and the like. The recent war, world politics, current world economics and exchange difficulties have thrown our old friend 'comparative advantage' off balance. What to do *now* was a question that needed not only an answer but action as well. The British have answered by producing more because they couldn't at the moment buy more. They have also come up with a long time plan of producing still more. The plan is not rigid and, no doubt, will be subject to continual change."[4]

Few economists have found fault with the plan to increase the fluid milk, fresh eggs, potatoes, or even the 10 percent more beef based on better pasture use. A good many, however, do raise questions about the extra four and one-half million tons of grain called for by the targets; a few also wonder how high incentives will have to go to gain the various production goals, and how much these floor prices and subsidies will cost if world food prices drop sharply.

France[5]

Before the war 85 percent of the food supplies of France was produced on French farms, and 70 percent of the imports came from overseas territories, mostly as fats, fruits, vegetables and feeds.

[4] E. N. Holmgreen, *op. cit.*

[5] Based on a report from K. J. Nicholson, Chief, Food and Agriculture Division, ECA Special Mission to France; and R. C. Desmond, Acting Agriculture Attache, American Embassy, Paris, March, 1949.

These supplies, together with wines and other alcoholic beverages, gave the French people an average caloric intake which was one of the highest in the world.

The war and a series of years of bad weather placed France's agriculture in a critical condition. Fertilizer was reduced, machinery was worn out from use or idle for lack of parts, horses decreased in numbers, fuel was not available for the few thousand operating tractors, and manpower was reduced. The drought of 1945, and the hard winter of 1947 followed by a summer drought, resulting in two of the worst crop years in a century, left France with a 200 gram bread ration and a total average consumption of only 2400 calories in 1947–48. Food was truly the major concern of everybody, furnishing part of the basis for continued black markets, inflation, political disturbances, and a heavy drain on national resources to keep the food situation in hand, even with very large imports from abroad.

During the first quarter of 1949, as a result of a very favorable crop in 1948, and continued help from abroad in the form of ECA aid, France appears to be slowly but constantly making progress on the road to recovery. However, the balance is still so sensitive that another poor crop or other economic setbacks could have very dire consequences.

Crop production in 1948 was 93 percent of prewar in relation to 80 percent in 1947, by far the largest part of the change being due to vastly improved weather. All types of livestock and poultry production are increasing materially. Individual rationing of bread has been dropped, prices of many agricultural commodities are easing, and black marketeering of food is disappearing. Significant surpluses of vegetables and potatoes have appeared. Major foods in short supply are milk, fats and meat, the first two still being rationed, but important improvement for all three is expected if feed grain imports are continued and another favorable crop year follows 1948.

ECA aid has had a large part in easing the food situation since it began operations. In the first few months this came in the form of bread grains to lift the bread ration from the low point it had reached in the early spring of 1948. Purchases of processed milk financed by ECA were intended to enable the French to meet the milk ration for children in the winter period of low production. Imports of vegetable oil-bearing materials and oils, that have

always been essential to the French economy were made possible by ECA. In the future, however, the means of increasing home food production will receive more emphasis than direct foods in the ECA program.

The ECA program in France operates within the framework of a four-year program and of yearly programs developed by the French Government as a member of OEEC (Organization for European Economic Cooperation). Present French plans call for increases of agricultural production by 25 percent above the rate of production in the second half of 1948. The increase is to be accomplished in part by an extension of the area in key crops, but largely by a sharp improvement in yields and a more intensive utilization of land resources. In particular, the yield of wheat is to be increased from a prewar average of 15 quintals per hectare to 20 quintals per hectare in 1952, and thousands of hectares now in pastures or natural meadows are to be converted to annual forage crops because of their higher yields. Total forage units available for feed, other than from straw, are to be increased by one-sixth.

In addition to a doubling of use of fertilizer, the program assumes that lime application by 1952–53 will have reached a rate five times that of 1938–39. Also, there is to be a rapid increase in supplies of tractors, other farm machinery and maintenance parts. A major program is planned to speed consolidation of small land parcels affecting two million of the 3.6 million hectares needing consolidation. A plan is also projected to regroup crops grown on the parcels not consolidated.

Further, the French program calls for the use of the principle of price guarantees to farmers as an inducement to necessary investment, and to the adoption of the improved techniques. In addition to investment by farmers from their own capital, large extensions of credit are to be made by the Government, and business firms serving agriculture are expected to invest heavily in the production and distribution facilities necessary.

The attainment of these goals would do much to solve France's problems. However, it is by no means certain that these goals can be attained within the period of ECA aid. In spite of the very favorable crop yields in 1948, first year performance is below the goals, and there are no indications yet that 1949 goals will be reached. Many of the parts of the program necessary to accomplish the goals are still in the planning stage, yet to be implemented.

The French have no adequate counterpart to the American action agencies administering programs to adjust individual farm production, to improve the facilities of production, or to supply farmers with the means of increased production and to demonstrate their best use. There are no county, community or individual farm goals, no county farm committees, no ACP payments, no government distribution of fertilizer, no Farm and Home Hour, and no soil conservation districts in France. Lacking personnel and funds, Departmental agricultural services are generally forced to limit their extension activities to a few demonstration plots and to speeches to farm groups. The major tool employed by the Government to adjust farm production in line with long-time needs is the guarantee of attractive prices for key crops, such as wheat, oil seeds, and sugar beets, Beyond this price support policy, governmental extension of credit, governmental encouragement of consolidation of parcels, and a few government subsidies for imported materials such as oil cake, custom largely determines what French farmers produce and the methods they employ.

For the economy as a whole, many major problems exist. France's most critical shortage is power. This results in a continued reliance upon manual labor and antiquated methods by American standards. This situation grows out of a long period of fear for their security as a nation and individual lack of confidence in the franc. Net investment was negative for many years. In agriculture it was retarded by lack of purchasing power prewar and a lack of materials in recent years. Those with francs want hard currencies or commodities which can be held or converted to cash easily as the changing value of the franc dictates.

As of March 1, 1949, prices were about 20 times prewar, with agricultural prices turning downward, while industrial prices show some indication of levelling off in face of increasing economic activity. Trade balances continue unfavorable, metropolitan exports to foreign countries being only 46 percent of imports from those countries in 1948. From this latter situation is created the principal question confronting all French planners, namely, how to earn more foreign exchange, particularly dollars, and how to obtain what is needed from abroad without having to pay for such imports in dollars. France, like the United Kingdom, is embarking on a major program of expanding home food production because she cannot sell enough abroad to take care of her food needs.

Italy[6]

The ECA program in Italy also has as its first objective increased production. This is to be accomplished by improving the unit yields and extending the productive cropping areas by reclamation, irrigation and land improvements; by shifts in land use to a more intensive agriculture and a higher utilization of the land and labor resources of the country; and by modernization of Italy's agriculture commensurate with her practical, physical and economic limitations. In addition the program is striving to raise the standard of rural living by providing roads, schools, utilities and houses in large areas woefully lacking in these facilities; and to broaden the base of land ownership to attain in a measure at least an improvement in the social problems which weigh so heavily on Italy.

Positive action on many fronts is directed toward fulfillment of these objectives, and the ECA program is used to accelerate the long-time trends. There will be a gradual shifting away from the over-emphasis on grain to a more intensive agriculture. Cattle will be gradually increased; the production of dairy products stepped up by herd improvement. Of particular interest is the good start which has been made in artificial insemination with 10 percent of the dairy cows already bred by this method. Vegetables and fruits will certainly be increased.

An extensive irrigation and reclamation program has been implemented under which three and a half million acres will be reclaimed and improved—and irrigation provided for 1,300,000 acres. Work is ready to start on many projects which will bring improvements in production as early as 1949. Work will be provided for 150,000 men for the next year. Production in dry farming areas will eventually be increased by 30 percent and on land where irrigation is provided, by 200 percent.

The implications of such a program are far-reaching. It means a great transformation of large areas now undeveloped. The gains will be not only economic but social. It will result in agriculture absorbing more people, important because over-population is a major problem. It is estimated that after the improvements are made there will be an average increase in employment from 40 work

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[6] Based on reports from Harry McClelland, Chief of Food and Agriculture Division, ECA Special Mission to Italy, Rome, February, 1949; and Howard R. Cottam, First Secretary of Embassy, and Robert A. Brand, American Embassy, Rome, February, 1949.

days per year per hectare in the dry farming areas, up to 200 work days per year per hectare on irrigated land.

Much of this work will be done in the south of Italy, in Sardinia and Sicily where the need is great. The ECA Mission has already examined in the field, prepared reports and submitted recommendations on twenty such districts. Plans are ready and work should start at once. The examination on the ground has been made in great detail by the Chief of the Division and by the Reclamation and Irrigation Specialist. Every canal, dam, road or flood control project has been passed upon—out of this has come a fine cooperation with the Italian government.

Another interesting development is the introduction in Italy for the first time of hybrid corn. Two thousand tons embracing 16 varieties of American hybrid, tested and found suitable for Italy, will be planted (last year 40 tons were used). The results obtained have been spectacular, with yield increase up to 86 percent over local varieties, with an over-all average well above 50 percent. For 1949 this should bring about an increase of 150,000 tons in corn production.

This represents the initial stage of a long range development which may culminate in Italy producing the hybrid seed corn for all of Europe. All of this is being done with direct assistance of ECA finances. When it is realized that over three million acres in Italy are planted to corn each year, the possibility of extending production of hybrid corn opens up new possibilities for livestock expansion and increased supplies for manufacturing.

Other experimental work along practical lines has been implemented by ECA. A top flight agronomist will study in the field the best way to adapt new crops to the great areas to be improved. Helicopters purchased with ECA dollars will be used to fight the dacus fly which does millions of dollars damage to the olive crop. ECA assistance is being given to rebuild a more vigorous extension service upon which will rest the sustained progress of Italian agriculture. Schools of instruction to farmers will bring to them for the first time some fundamental principles of new and modern husbandry and open up to them vistas of the new agriculture. A fund is provided to assist and help the individual make necessary improvements on his own farm; the small farmer will be helped to become an owner under current government plans.

ECA assistance given Italy in the form of large imports of foodstuffs, and increased domestic production has resulted in marked improvement in the food situation. Controls on all foods except a portion of cereals have been eliminated; that is, consumers are assured rations of 200 grams of bread and 100 grams of pasta per persons per day. Additional bread and pasta are available on the free market at prices only slightly higher than those of comparable rationed products. Foreseeable imports of breadgrains from the U.S., Argentina, and Iron-Curtain countries are sufficient to meet Italian consumption requirements until the new harvest.

One of the most important current problems of food distribution is the inadequacy of domestically produced fats and oils due to the very poor 1948–49 olive crop. The government has taken steps to solve this problem by contracting for 47,000 tons of edible fats and oils during the first half of 1949, in order to avoid the danger of price increases, particularly of olive oil.

The report from Italy closes with a thought common to most of the reports, "American agricultural economists may be interested to note that it is becoming increasingly evident that in the years to come Italy, and as a matter of fact all European countries, are going to buy where they can sell. That is axiomatic—and if the United States is to maintain its trade in agricultural commodities in a highly competitive market, it must revamp its trade policies to permit Italian goods freer movement. Otherwise Italy will look to the Argentine and to the East for her wheat and fats and oils and to other areas where Italian products are purchased."

Bizonal Germany[7]

The greatest problem facing Western German agriculture today is that of increasing production to provide for a refugee-expanded population 20 percent larger than prewar; and to offset as far as possible the loss of the highly productive areas east of the Oder-Neisse Line. This means a greater intensification of production, a shift to direct food crops with higher calorie yields per hectare, increased imports of fodder, and a limited production of livestock and livestock products for domestic consumption. It seems unlikely that the high prewar rate of consumption of meat, fat, and other

[7] Based on a report from Paul Quintus, Bipartite Control Office; Food, Agriculture and Forestry Group, Frankfurt, Germany, March, 1949.

animal products will be achieved in the foreseeable future. On the contrary, the German diet will probably consist largely of cereal and vegetable products for an extended period.

Thus the agricultural policy aims not only at increasing production but developing a much more intensive type of farming and better crop rotation. The root crop area should be expanded considerably, and the area under pulses and oil crops is to be expanded, both as a means of soil improvement and to provide edible fat and oil cake for the cattle. These adjustments must be made at the expense of fodder grain and grasslands, however; a course of action squarely opposed by the farmers' strong determination to hold to the traditional farming pattern of livestock farming. It will be exceedingly difficult to keep livestock numbers in balance with available fodder supplies. So long as adequate fodder is imported the results need not be unfavorable. But if fodder imports are too small, home grown grains needed for direct human consumption will be fed to livestock and poultry. This is the reason every effort is being made to increase the availability of fodder grain and protein concentrates with ECA funds and through trade agreements.

ECA contributions to the bread grain program and direct fodder imports have greatly improved domestic butter production and have permitted an expanded hog raising program. In the first instance, better bread grain supplies have made it possible to lower the extraction rate for flour with increased milling residue for dairy cattle. This residue, oil cake from imported seeds, and imported feed concentrates coupled with a heavy crop of indigenous fodder during 1948 resulted in a sharp recovery in milk production this past winter. The combination of larger fat imports with ECA funds and stimulated domestic fat production have permitted an increase in the monthly fat ration for the normal consumer from 125 grams in March, 1948 to 750 grams in March, 1949.

A correlated problem facing agricultural planners in Western Germany is lack of the technically well-trained farm population necessary to maximize production. At present there are only six agricultural colleges in the Bizonal area, which has an estimated five million farm population. In June, 1948, these colleges had a combined enrollment of 2,700 student which was considered exceptionally large. The German agricultural education system is especially deficient in facilities for bringing the results of agricultural

research to farmers. A tentative request for 30 million dollars of ECA funds has been made as the minimum amount necessary for bringing about the desired improvement and expansion of agricultural teaching, extension and research facilities.

While most food and agriculture controls are still in effect in Western Germany a transitional period of relaxation and elimination of such controls is giving rise to new problems. A particularly serious problem which agricultural economists may be interested in watching is that of adjusting domestic agricultural prices to world price levels. For the fiscal year 1948–49, for example, it is estimated that wheat imported into Western Germany will cost $109 or 363 DM per metric ton as compared with a domestic wheat price of approximately 250 DM per metric ton. Comparable prices for coarse grain are 283 DM per metric ton for imports and 190 DM for domestically produced coarse grain. In the case of sugar the situation is reversed, with imported sugar 370 DM per metric ton as compared with a fixed price of approximately 475 DM for domestically produced sugar. A decision will have to be made as to whether the prices of these and other commodities are to be permitted to rise or fall to world price levels, or whether they are to be controlled independently of world prices by means of subsidies, import duties, equalization schemes and other devices.

Although the direct expenditure of ECA funds in Bizonal Germany has been relatively small, this cannot be taken as a true measure of the role which ECA funds are playing in the recovery of Western Germany. It is largely due to the existence of these funds that the export trade of the Bizonal Area is able to finance urgently needed food imports.

Much of the gain from ECA activities is intangible and even psychological. In any case the export trade is rapidly climbing to a level which will enable Germany to finance to an ever increasing degree the food imports needed to maintain and improve a scale of nutrition which a year ago seemed out of reach.

Denmark[8]

In contrast with most other European countries, no major changes are contemplated in the pattern of Danish agricultural production in the long-term program. By and large the agricultural

[8] Based on a report from George L. Peterson, Agricultural Officer, ECA Special Mission to Denmark, Copenhagen, February, 1949.

goal is to restore prewar production. The combined tonnage of milk, beef and veal, pork and bacon, eggs and poultry meat projected in the long-term program is approximately seven percent greater than prewar production.

Before the war, Denmark exported 83 percent of its butter, 66 percent of its bacon and 70 percent of its eggs. In order to export the largest possible volume, domestic consumption of butter, margarine and pork is held down by tight rationing. From a food standpoint, the Danes enjoyed a much higher standard of living during the war than now, because they could not export to England and they delivered as little as possible to Germany.

The end objective of Danish agriculture is to produce butter, bacon and eggs; all other agricultural production is of secondary importance or an intermediate step. To produce the maximum amount of butter, bacon and eggs, Denmark has always imported a large amount of feeds, mostly from dollar areas. Because these imports were not available during the war, cow numbers fell to 85 percent, pigs to 38 percent, and chickens to 38 percent of the prewar average.

In 1948 milk production was back to approximately 77 percent of prewar; butter production 66 percent of prewar; bacon and pork production 52 percent and eggs 79 percent of the prewar output. It is too early to measure the effects of imports of feed stuffs on the output of livestock products, but the number of cows at the end of 1948 was 63,000 above the same date in 1947; and pig numbers were roughly 500,000 more on December 31, 1948 than on July 1, 1948. A good 1948 harvest and the import of oil meals and oil seeds with ECA assistance account for increases in production.

In connection with imports of oil meals, however, a distinct effort is being made to reduce the amount of oil cake used in relation to prewar use. The use of coarse grains and silage from root tops is to be increased. The change is an effort to decrease the need for dollars for oil seeds and oil meal imports.

ECA assistance is particularly helpful in purchasing tractors and tractor machinery. Denmark is today in about the same stage of mechanization as the United States in the early 1930's. There are altogether too many horses for economical production. Before the war there were about 4,000 tractors; there are now between 8,000 and 10,000. As a result of imports of farm machinery the number of farm machinery stations—most of them private farmers

—who do custom work for the small farmers, almost doubled in 1948. There were 425 such stations at the last count. About 1,700 tractors from the U.S. will come in under the 1948–49 program and about 2,500 in the 1949–50 program.

A trend in Denmark's agricultural policy of particular interest to agricultural economists is the political pressure to increase the number of small farms (under 25 acres) at the expense of the larger farms. At present, Danish farms average 38 acres, the largest in Europe with the exception of England. As a result of legislation in 1899 and 1919 providing government assistance for the establishment of small holdings, the average size of Danish farms went down about 3½ acres. At present, consolidation of two or more farms into a larger unit is prevented by law.

Another matter of particular interest is the dairy industry. There are in Denmark (16,600 square miles in area) approximately 1,600 dairy plants, of which somewhat more than 1,300 are cooperative. Most of the milk is delivered by horse and wagon. The management is aware that costs of production can be reduced by truck delivery to larger plants. It is intended over a period of years to reduce the number of creameries to somewhere between 300 and 400.

Restoration of trade is particularly important to Denmark. The United Kingdom is still the most important market for Danish butter, bacon and eggs, but substantial amounts have also been sold to Sweden, Russia, Belgium and Finland, and even 5,000 tons of butter to Canada. Prewar, 24 percent of Denmark's agriculture exports went to Germany, and restoration of that trade, particularly with the Bizonal area, is aimed at. Denmark would also like to export butter (primarily) cheese and pork products to the United States. Denmark must obtain dollars to purchase feed supplies (oil seeds or meal and coarse grains) which are available almost exclusively in the dollar areas. Unless she can export to the U.S. or the United Kingdom can provide convertibility, economic solvency by 1952 cannot be foreseen.

Belgium and Luxembourg[9]

Belgium and Luxembourg are returning to their prewar pattern of intensive farming, and this course is undoubtedly in line with long-time needs. ECA is making it possible to import sufficient

[9] Based on a report from Jerome T. Gaspard, Agricultural Attache, American Embassy, Brussels, February, 1949.

foodstuffs for Belgium and Luxembourg to maintain their food consumption close to prewar levels. It has also made possible some very limited imports of agricultural machinery, and it is hoped that ECA will finance substantial imports of feedstuffs to make possible a restoration of prewar levels of production of livestock, dairy and poultry products.

In addition to continued good weather, the chief requirement of Belgian agriculture is the importation of sufficient supplies of feed grains. With the world grain shortage, world grain exports have been used almost wholly for human consumption, and Belgium has not found it possible to import normal feed supplies. As a result of the large 1948 corn crop in the U.S., the resumption of normal feed imports should soon be possible.

The most important problem facing Belgian and Luxembourg agriculture is that of making the necessary adjustments to meet the Dutch competition which will be felt under the Benelux Economic Union. Under the agreement of May 9, 1947, the three participating countries agreed that each country could limit its imports of agricultural products from its partners if the prices of such imports were below certain minima established by the respective countries. This agreement was specifically designed to prevent Dutch dumping of agricultural products in Belgium and Luxembourg. The Dutch costs of production are lower than those of Belgium and Luxembourg, and these two countries will be forced to take every possible measure to lower costs.

In this connection, there is no doubt that it would be desirable for Belgium to mechanize much more than it has to date, but several factors are operating to retard mechanization. There is currently considerable unemployment in Belgium and there is therefore no shortage of farm labor to create pressure for mechanization. In addition there is a tax on tractors, and a very high tax on gasoline. This high tax makes it economical for Belgian farmers to keep horses and oxen, which often eat up half the produce of small Belgian farms. According to the May 15, 1948 census, Belgium had only one tractor for every 100 farms.

The Belgian dairy industry requires considerable improvement at all stages: on the farm, in the processing plant, and in the distribution sector.

Although the Boerenbond (Farmers' League) has a highly developed extension service for its members, the extension service

of the Ministry of Agriculture is quite inadequate, and there is no effective means of passing on information from the agricultural colleges to the individual farmers. This is of particular importance in view of the Benelux Economic Union, and the highly effective Dutch extension service.

Despite the generally favorable economic situation there are disturbing factors: unemployment has risen to about 250,000 and prices are high, about four times the prewar level. It appears that 1949 will be for Belgium and Luxembourg a year of readjustment.

Norway[10]

Long-term agricultural plans in Norway worked out in connection with the ECA provide for increased efficiency in Norwegian agriculture. The program emphasizes crops best suited to the soils and climate, for instance the production of feed crops for the expansion of the dairy and sheep enterprises. It also stresses more pronounced grassland farming, with greater production of pasture and hay, and conservation in the form of grass silage, all to expand the production of animal products without too great imports of feed stuffs and concentrates.

Economic assistance to Norway by ECA has been of benefit to her agricultural program indirectly by financing raw materials and machinery imports required for reconstruction. This contributed to maintenance of full employment, which meant that the strong home market for farm products has been maintained. This maintenance of the home market may not be of greatest importance at present when the production of Norwegian farm products, mainly livestock products, is too small to satisfy the demand, but as production increases the maintenance of the home market becomes very important indeed.

As related to agriculture more specifically, Norway normally imports 80 percent of its bread grains, all of which have been financed by ECA since the beginning of the program. ECA has made it possible to import some concentrate feeds, even though the level of imports are still too low for full utilization of the productive capacity of Norwegian livestock.

There is a scarcity of agricultural labor, and the greatly increased cost of that labor creates an unprecedented demand for farm

[10] Based on a report from Einar Jensen, Agricultural Attache, American Embassy, Norway, March, 1949

machinery. There is, for example, a considerable demand for tractors—and no production of tractors in Norway. Were it not for the ECA assistance, only British tractors, not heavy enough for many Norwegian conditions, could be imported. Thus, ECA has speeded up mechanization and helped to provide machinery better suited for Norwegian conditions.

Also as a result of the ECA program, many more agricultural scientists from Norway are going to the United States for study. After the isolation from other countries suffered during the war years, there is a great need for such study abroad, with all the stimulation of ideas and work it involves.

Austria[11]

Austria, like Western Germany, has problems complicated by occupation. Austria is occupied by four powers, and food and agricultural supplies were furnished by the four occupation powers, by UNRRA, by Congressional aid and by interim aid, before the start of the ECA program. The big difference that can be noticed under the ECA program is the emphasis upon the rehabilitation phases of the food and agriculture policy, as compared to the dominance of relief assistance under the previous programs.

Livestock enterprises, especially the heavy grain-consuming hogs and poultry, suffered great decreases during and following the war because of complete lack of imports of feed stuffs and continued droughts. Under the ECA program feed supplies are being imported into Austria to supplement the increased production of 1948, so that livestock may be increased.

Long-time objectives for Austrian agriculture emphasize livestock—especially dairy cattle, which can effectively utilize the areas primarily adapted to grass production. The rough terrain and heavy rainfall makes many of the areas especially adapted to grass production.

Heavy applications of fertilizer are badly needed for both grass and crop areas. Phosphate and potash fertilizers are being imported under the ECA program in as large quantities as the farmers are able to buy. Likewise, supplies of seeds and other items necessary for increased production are being imported in quantities.

One of the big problems in carrying out the expanded agricultural

[11] Based on a report by W. S. Middaugh, Food and Agricultural Office, ECA Special Mission to Austria, and coordinated with Agricultural Attache.

program in Austria is price relationships. Great emphasis has been placed on price stability, and price-wage agreements between labor and the other elements of the economy have been reached only after protracted discussions, with agreement coming at about harvest time, rather than before planting time, which would be desirable to stimulate increased production. This lack of forward-looking price and the general philosophy that the agricultural sector of the economy fared well during the war and should now make sacrifices in order to maintain price stability, has meant that the agricultural production program has not had the desired impetus, and has not gone ahead as fast as would have been possible under more favorable circumstances.

Turkey[12]

Turkey's problem is also one of increasing production, not for home consumption, however, but for export. Turkey is at present self-sufficient in agriculture commodities and they have in the past made up approximately 90 percent of her exports.

The long-time agricultural program calls for increase in production of cereal crops, cotton, oil seeds, pulses, livestock and livestock products, and others. However, little or no consideration has been given to the development of the program from a standpoint of land use or over-all planning. It has been developed mainly commodity-by-commodity and there is need for a well-balanced agricultural mission from other countries to review the plan before it is finally adopted.

Turkey has only slightly over 6,000 farms that are 125 acres or more in size (with the exception of 13 large state-operated farms). In spite of this, 85 percent of the population is engaged in agriculture. Most of the farms are very small and crops are raised with nothing but hand tools. Very crude plows, many made of wood, and little or no equipment, insecticides, fungicides, are used on Turkish farms. Anything that can be obtained under the ECA program that will make it possible to improve tillage, plant corps at the proper time, prevent disease and destroy insects, and harvest and store crops properly, will materially increase total production and augment exports.

The ECA program, if carried out as planned, should increase

[12] Based on a report from Charles R. Enlow, Agricultural Attache, American Embassy, Ankara, February, 1949.

production tremendously, particularly in an undeveloped area of virgin wheat land of several million acres. Tractors and farm machinery are being obtained under ECA to develop this area. There are now 13 state-operated farms of approximately 700,000 acres in this area that have been in operation from three to four years. These farms have proved conclusively that the production of wheat and other crops by dry land farming is not only possible but practical. One of these farms, about 70 miles from Ankara, in a 17-inch rainfall belt, had 26,000 acres of wheat last year that produced 35 bushels per acre.

There is also a large acreage in Turkey suitable for gravity irrigation, and other extensive areas that show possibilities for pump irrigation. Turkey is a country of winter rainfall and any irrigation that can be carried out increases production tremendously. Under the ECA program, Turkey hopes to acquire well-drilling equipment, irrigation pumps, assistance in constructing dams, and technical assistance.

The problems in Turkey of primary interest to agricultural economists are principally the possibilities of increased trade. Turkey has many products including strategic minerals that are in demand in the United States, and production can be greatly increased. As far as agricultural products are concerned, the main problem is for the Turks to improve the quality of the products and establish a name for their goods. If these things can be done, it will be possible for Turkey to increase her exports to the United States and narrow the gap between her imports and exports.

NOTES

RELATION OF METHOD OF ACQUIRING FARM TO PRODUCTION FACTORS IN COTTON FARMING

SINCE the war increasing attention has been given to the problem of maintaining the continuity of farm operation between generations. It is an issue that has vexed land economists in this country for some decades because farm tenancy and scale of operations are involved. The thought has been that if farms can be passed on to the next generation systematically, the benefiting son or son-in-law would be attracted to farming as an economic opportunity at a comparatively early age. This would tend to reduce absentee landlordism and therefore tenancy. From the standpoint of economy of operation, farms passed on intact avoid parcellation and a size, layout and location generally uneconomic to operate. Furthermore if the farm passes to the next generation anti-mortem, considerable decline in productivity of the farm may be avoided.

Although there are many variations, the central theme of these experiment station bulletins and extension circulars has been the advocacy of a father-son arrangement by which the two would operate the farm jointly until the death or retirement of the elder man, when the farm would pass by inheritance according to previous agreement wholly or in part to the younger man. These are well meaning intentions but certain relationships which have turned up in a recent study[1] suggest that, if the same findings hold true for other segments of the agricultural economy, such an arrangement may mean less to agriculture than generally believed.

The farms in the study referred to were obtained by conventional sampling methods from 9 counties[2] in the Upper Piedmont of South Carolina and Georgia. In all 988 farms were obtained in this region[3] but only 624 farms had a production history of sufficient

[1] The study referred to, still in process of analysis, is a cooperative study of cotton yield variability between the University of Virginia and the Bureau of Agricultural Economics, Division of Agricultural Finance, Ralph R. Botts and E. Lloyd Barber, collaborators. Acknowledgment is made to the General Education Board for a grant in support of the project.

[2] Greenville and Pickens counties, South Carolina; Carroll, Clarke, Cobb, Douglas, Haralson, Jackson, and Madison counties, Georgia.

[3] A second sample of about 750 farms was obtained from West Texas but the data are not yet in a sufficiently advanced stage of analysis to make a similar study of inheritance as here described.

TABLE 1. COMPARISON OF SPECIFIED OPERATOR CHARACTERISTICS, PRODUCTION FACTORS, AND YIELD AND YIELD VARIABILITY DATA ACCORDING TO METHOD OF ACQUIRING FARM

(Based on 376 white owner-operators, males, from the Upper Piedmont)

Items	Farms reporting 3 or more years of yields, 1938–46	
	Acquired by inheritance[a]	Acquired by purchase
Number of farms	59	317
Average acres of cotton harvested	15.6	16.3
Operator's characteristics:		
1. Years of schooling	8.3	7.5
2. Age in 1946	53	55
3. Experience growing cotton on 1946 farm	24	18
4. Percentage of operators engaging in off-farm work in 1946	33	27
Farm practices for period (3 or more years between 1938 and 1946):		
1. Average fertilizer applied (in 100 lbs.)	4.9	5.2
2. Ratio of legume acreage harvested to cotton acreage	0.88	0.84
3. Percent of cropland in cotton	26	26
Percentage of farms in 1946 in severe erosion class[b]	30	22
Percentage of operators reporting:		
1. Farms operated with cropper labor primarily	36	27
2. Seed cleaned and/or treated regularly prior to planting	54	65
Farms reporting 3 or more years of yields, 1938–46:		
1. Average yield	304	332
2. Average coefficient of variation	27	27
Farms reporting 8 or 9 years of yields, 1938–46:		
1. Number of farms	32	157
2. Average yield	313	351
3. Average coefficient of variation	27	25
4. Trend in yield, lbs. yearly	3.6	6.3

[a] Farms were considered as inherited if over 50 percent of the existing 1946 farm was so acquired.

[b] Based on judgment of enumerator, who was generally an employee of the county AAA office.

duration to give 3 or more years of yields. Comparative data according to two methods of acquiring farms for a homogeneous class of owner-operators are given in Table 1.

The data show that the operators of purchased farms, 317 in all, obtained 28 pounds more of lint cotton per acre for an average of 3 or more years during 1938–46 than those operators (59) who inherited their farms; there was no significant difference in variability of yield for the period. Increasing the number of years included in the yield average improved further the margin in

favor of the operators of purchased farms. Among the farmers in this group who purchased the farm which they were operating in 1946, 157 reported 8 or 9 years of yields in the 9-year period from 1938 to 1946. There were 32 comparable farms which had been inherited by their operators. As shown in the table the operators of purchased farms averaged 38 pounds or 12 percent more of lint cotton per acre during this longer period than did the operators of inherited farms, and had 7 percent less yield risk as measured by the Coefficient of Variation. Furthermore, the former were improving their yields at a more rapid pace than the latter, the yearly upward trend averaging 6.3 pounds as compared to 3.6 pounds of lint per acre.

Further examination of the data shows wherein the operators of purchased farms were superior and inferior to those of inherited farms. It is apparent they are not greatly superior in the production factors, certainly not sufficiently so to explain the yield differentials. Although a higher percentage of the inheritors occupy more severely eroded farms the differences are not great otherwise. The purchasers used 30 pounds of fertilizer more per acre and had a somewhat better record as regards treating and cleaning of planting seed but again these factors, and even taking into account the somewhat less erosion, probably are not sufficient to account for the higher average yield of those farmers who purchased, especially when the favorable factors of more education and younger average age of the inheritors are taken into account. Some of the difference must be due to entrepreneurial ability and conditions under which the two classes of farms are operated.

The conditions under which farms are acquired by inheritance may be, for analytical purposes, divided into two major categories —those left in the natural course of events to the non-resident child, and those farms left as consideration for the child's having remained on the farm.

Farms may pass by inheritance to city relatives or to farmers of the same type who live in the community or on an adjoining farm. In the former case the inherited farm would as a rule be operated as a tenant farm, and the effects on yields and yield risk would be those of typical tenant-operated farms with uncertain tenure. On the other hand, if the heir resides in the community, or on an adjoining farm, he would have the familiarity and interest in farming as a profession to capitalize on his good fortune. Such

farms would be expected to show up more favorably in yield and yield risk than other classes of farms.

Where the farm is bequeathed as a reward for the child's remaining on the farm, although the factor of interest can be reasonably assumed, the operator is more probably of lower inherent entrepreneurial ability and less maturely developed in the little he has than the typical owner-operator who purchased his farm with money saved or raised through some financial institution. While the purchased farm reflects the owner-operator's likes and judgment in its selection, the inherited farm shows neither. Obviously, those who inherit farms through this sequence of events would be expected to be less bold and energetic than their brothers who acquired land by other means, or left the business of farming altogether to find city employment. Furthermore, their entrepreneurial development would be hindered by the domination of the older generation, which would often prevent them from reflecting the alertness and progressiveness of their age in farm operation. On these farms this means that by the time the father passes out of the picture, the younger man often will have passed his physical prime and have become set in the ways and methods of a generation once removed.

Among the 59 inherited farms included in the analysis 18 operators had acquired considerable experience on the farm inherited prior to becoming its operator, 41 had not. The operators with experience on the farm prior to inheritance averaged 40 pounds or 13 percent less lint cotton per acre than the operators reporting no previous experience on the inherited farm. There was no significant difference in yield risk; but considering only those farms with 8 or 9 years of yields during the period, it is found that the inheritors with previous experience on the inherited farm had on the average a downward trend in yield of 4 pounds of lint cotton annually in contrast with an upward trend in yield of 6 pounds yearly by the inheritors with no previous experience on the inherited farm.

Although the number of operators with previous farming experience on the inherited farm is somewhat small for the significance desired, the results afford considerable support for the thesis, advanced above, that the son who remains on the farm with his father is more likely to be low in certain entrepreneurial abilities and have less chance for development of them than the son who strikes out on his own.

These relationships may not be applicable to those types of farming where a very high order of intellectual ability is required, and where frequent and important changes of technique occur. Both conditions would tend to produce progressive entrepreneurs in both generations. Also, irrespective of type the operators of large farms may and frequently would be sufficiently progressive to give the heir selected a free hand and to create opportunities for his entrepreneurial development. The author of this article is informed, however, that a very large Mississippi Delta plantation operator recently requested an only son upon his graduation from college to seek employment elsewhere until the farmer's certain retirement when the latter would return and take full control. The entrepreneur in question obtained his farm the hard way and is one of the most successful farmers in the Delta. He apparently is convinced that two lights shine less sharply together than either alone.

Certainly, maintaining continuity of operation between generations is quite desirable and a worthy objective if it can be accomplished without lowering the quality of farm operators and reducing the general level of efficiency of the agricultural economy as a whole. It seems necessary, however, if the above results are found to prevail in the other major segments of agriculture, that the second generation come into the picture as completely as possible in every respect. But such is not in accord with the traditions of American agriculture. The older generation insists upon staying in the picture and too frequently in a cramping and often dominating position, so that there's confusion as to who is in charge and hesitancy, delays, and half-measures in the control and in the making of progressive changes. What is needed is an effective retirement system which will get the older generation off the feet of the younger generation. In general retirement is not within the reach economically of the vast majority of farmers. But extending the Old-age and Survivors Insurance benefits of the Social Security program to farmers would help. Even this plan would not be completely successful because of the very modest scale of benefits. It would be more successful, however, if some plan could be devised by which a part or all of the retiring farmer's equity could be recovered and joined with the Social Security benefits in the form of an annuity for the remainder of his life and that of his spouse when she survives. If coupled with a farm or village housing plan which

would enable retirement to the place of their choice, either on the home farm at non-interfering distance from the farmstead or in a favorite nearby village, the aged in agriculture would have not only security to look forward to but also comfort and independence, while agriculture would have an efficient and sensible solution to a troublesome problem, one which along with many other factors keeps the industry working at less than its maximum efficiency.

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ACCURACY OF LIVESTOCK PRICE FORECASTS AT KANSAS STATE COLLEGE

MONTH-to-month forecasts of livestock and grain prices have been made by staff members of the Department of Economics and Sociology of Kansas State College since 1925. These forecasts appear monthly in a printed publication entitled "The Kansas Agricultural Situation."

Difficulties in Measuring Livestock Price Forecasts

The principal difficulty confronting an analyst who attempts to measure the accuracy of a monthly price forecast is the lack of a standardized terminology to describe accurately the three dimensional variables of direction, timing and magnitude of price change. Such terms as "higher," "stronger," "steady to moderately higher," do not permit accurate statistical measurement.

The forecasting of livestock prices is not an exact mathematical science. Although analysis of historical, statistical data plays a prominent part in forecasting, such a procedure usually serves to give the forecaster only a rough indication of the effects of the various measurable factors influencing livestock prices, rather than to provide a definite answer regarding the exact price to expect.

Once the forecaster has determined the importance which he should attach to the various statistical indices, the problem of forecasting becomes that of keeping abreast of new or unusual developments in the commercial, political, and agricultural situation, and then properly evaluating the effect which these developments will have on price.

Method of Determining Accuracy of the Forecasts

Since an important element of uncertainty in the measuring of the accuracy of these forecasts was the determination of a quantitative meaning to be attached to the various terms used in stating the forecasts, an arbitrary statement, based on estimates of men engaged in making the forecasts, was prepared.

In preparing this score table (Table 1) it was decided that it would be illogical to hold the forecaster to an exact percentage

TABLE 1. SCORE TABLE FOR MEASURING ACCURACY OF PRICE FORECASTS

Forecast	100 percent	Score 66 percent	33 percent
	Percent change in price		
Substantially higher	5% or over	4% or over	3% or over
Higher	4% or over	3% or over	2% or over
Moderately higher	3 to 7	2% or over	1% or over
Slightly higher	2 to 6	1 to 7	0 or over
Steady to higher	1 to 5	0 to 6	−1 to 7
Steady to moderately higher	0 to 4	−1 to 5	−2 to 6
Steady to slightly higher	−1 to 3	−2 to 4	−3 to 5
Steady	−2 to 2	−3 to 3	−4 to 4
Steady to slightly lower	−3 to 1	−4 to 2	−5 to 3
Steady to moderately lower	−4 to 0	−5 to 1	−6 to 2
Steady to lower	−5 to −1	−6 to 0	−7 to 1
Slightly lower	−6 to −2	−7 to −1	0 or lower
Moderately lower	−7 to −3	−3 or lower	−1 or lower
Lower	−4 or lower	−3 or lower	−2 or lower
Substantially lower	−5 or lower	−4 or lower	−3 or lower

change for the meaning of each term, and in view of this a rating table was constructed which allows a certain range in the meaning of each forecasting term.

Each month's forecast was scored on the basis of the actual price movement during three ten-day periods of the month. The object in dividing each month into these three periods was to allow some credit for a forecast which may have been correct the first ten or middle ten days of the thirty-day period for which these forecasts are made, but which became inaccurate during the latter part of the month. Since these forecasts are intended to extend over a thirty-day period, and since more credit should be given for a forecast that was accurate throughout the entire month, an arbitrary weight of one was assigned to the score of the first ten-day period, two to the second, and three to the third. The later periods of the month were thus more heavily weighted. Having determined

the percent price change represented by each forecasting term, and the weight to be assigned to the accuracy for each ten-day period of the month, it was a simple procedure to score the accuracy of the monthly forecasts. Having scored each ten-day period, the weighted scores were averaged for each month, and a yearly average taken.

Accuracy of Hog Price Forecasts

During the period 1925–40, hog price forecasts made at Kansas State College averaged 64 percent correct.

A study of the seasonal variation of the scores of the actual forecasts shows a distinct seasonality in the accuracy of the predictions. The least accurate months were August (47 percent) and April (50 percent). The month during which the forecasts were most accurate was November, scoring 77 percent.

It was recognized that the arbitrary scoring table and the varying weights would affect the score obtained. Therefore, the calculated score was measured against a score obtained by using the average seasonal price variation as the only basis of the forecast. This forecast was based on the average seasonal price movement for 200–250 pound good-to-choice fat hogs at Kansas City during the period 1922–38. The average accuracy of the forecast based only on the seasonal price variation was 37 percent. This indicates that the hog price movement during an individual year differed considerably from the average seasonal pattern.

Having obtained the scores on both the actual forecasts and the forecast based on seasonal price variation, it was then possible to calculate an index which would show the extent to which the effects of factors other than the average seasonal price movement had been correctly estimated. On the basis of this index it was found that the actual hog price forecasts averaged 72 percent more accurate than the forecasts obtained by using only the seasonal price movement.

The objective evaluation of the hog price forecasts indicated an average accuracy of 64 percent. The forecasts were more useful than the score indicates. When these forecasts are scored only on the basis of whether or not they indicated the general direction in which the price moved, a somewhat better result is obtained, the forecast being accurate 69 percent of the time.

For purposes of comparison, a study was made of the accuracy that would have resulted if the forecast had been based on a

continuance of the trend as indicated by the previous thirty-day period. When the previous thirty-day period was used as the basis for forecasting an accuracy of 56 percent was obtained.

Accuracy of Cattle Price Forecasts

During the sixteen-year period cattle price forecasts made at Kansas State College averaged 62.7 percent accurate, ranging from a low of 37 percent accurate in 1931 to a high of 94 percent in 1929.

The seasonal variation in the accuracy of cattle price forecasts did not exhibit as great a degree of variance as did that of hog price forecasts. However, there was a general tendency for the forecasts to be more accurate during the late winter months and again during June, July, and August.

Using the average seasonal variation in the price of choice 700–1,100 pound steers at Kansas City 1922–38 as the basis for forecasting price, an average accuracy of 52.7 percent was obtained. During the months of April, August, and October the actual price changes most nearly corresponded to the change which would be expected from the average seasonal price movement. The actual forecasts made were 23.6 percent more accurate than those based only on the average seasonal price movement.

When the forecasts were rated in regard to their accuracy in predicting the general direction in which the price would move, it was found that they were accurate 68 percent of the time. When the trend during the previous thirty-day period was used as the basis for the forecast, an equal degree of accuracy was obtained. Thus it would appear that the general direction in which the price has been moving would be one of the most important factors to consider in formulating a price forecast for cattle.

Effect of Magnitude of Price Change upon Accuracy of Forecasts

The price forecasts made appeared to be most accurate during those periods in which there was little change in price and least accurate when the change was great. The hog price forecasts ranged in accuracy from 72 percent when there was no change in price during the thirty-day period to 59 percent when there was a great change in price. Cattle price forecasts ranged from 68 percent accurate during periods of no change to 57 percent during periods of great change.

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RATE OF COMMODITY DISAPPEARANCE AND CONSUMER PREFERENCE

BECAUSE of the augmented program of research in marketing, many agricultural economists in the United States are finding themselves involved in the fields of psychology and statistics to a greater extent than formerly. Although these two fields are far from being unrelated, the former deals more with logical classifications of mental concepts and resulting human behavior, while statistical methods are the tools and devices for measuring the intensities and interactions of these concepts and the probabilities of repetition of behavior.

Terminology in the field of consumer preference is confusing. As one travels around the United States he hears people express desires in such terms as *like, fond,* or *love.* It is entirely possible that the housewife who at her bridge club "just loves" the cake from a certain recipe "likes" it at home if she is sincere. This makes it difficult to measure people's opinions by their verbal expressions. At any rate, a survey of people's opinions as to how they "feel" about subjective matters may be entirely fruitless unless it is carefully planned both from the standpoint of statistics and psychology. A physician might probe a patient's abdomen and ask whether it hurts "much." If the patient has a subjective concept in which significantly less pain than exists in the mind of the physician means "much" he may pay for an unnecessary appendectomy, whereas if the reverse were true he may die for lack of necessary surgery. A better method would be to probe the general region of pain asking the patient to describe the degree of pain and plot directions of trends of increasing pain in order to localize the pointof greatest pain. The points would thus be plotted in terms of the patient's own scale of subjectivity instead of the patient's compared with the physician's. Subjectivity can not be a constant even within one mind, but it will come closer there than if its interpretation must be conveyed to another mind. It should be borne in mind in consumer opinion surveys that the responses, unless manifested by measurable action, are entirely subjective and can be measured only in terms of this subjectivity. Measurement can best be carried out by finding out what a persons's choice would be out of two or more alternatives and get the verbal expression of choice in the chooser's own relative and superlative terms.

There is a large gap of unrealism between a consumer opinion survey and what the consumer actually would do if the conditions assumed in the question actually existed as freedom for real choices. It is not uncommon to hear people say, "I would give my right arm for that." Although it is merely a figure of speech it means a very high price in their minds. A high price is stated because they are sure the commodity is not on the market. People are not willing to tax their mental energies beyond rather loose opinions and evaluations unless their energies are to bear fruit in reality. It is thus ordinarily more difficult to analyze and derive valid conclusions from statistics of opinion than statistics of behavior.

Those specializing in opinion surveys are making progress in correlating loose opinions and evaluations with real behavior despite indications of serious reversals. For many purposes, what people say they will do when a condition presents itself is the best index (adjusted by former correlations) of what they will actually do. However, the correlation between opinion and action can never be perfect, so, if the individual can be observed under experiments setting up actual conditions the results will be more reliable. Both consumer opinions and instances of behavior are imperfect manifestations of preference but it is probable that behavior is a better basis for predicting preferences. On this basis, consumer preference should not be determined from opinion if it can be determined from observed behavior at the same time and cost.

In experiments on consumers' preferences a procedure not entirely unknown to the vendor has been used. The plan has been to offer the consumers two or more choices and to shift the prices to affect the rates of purchases. When these prices have not moved goods at the relative rates desired by the merchant he has, as a result of previous experience, hunches, or trial and error, shifted the prices more. Having found his errors too great he puts on his "clearance sale." Those commodities that have in his estimation moved too slowly are reduced in price. Actually they then sell for less than they would have if they had been priced competitively with other commodities at a normal rather than an accelerated rate of disappearance.

The merchant may choose arbitrary rates at which he wishes different commodities or different grades or qualities to disappear from his shelves. In general, the limits of his arbitrariness are set only by his capacity to lose money. The researcher should not

choose arbitrary rates. He can not assume as the merchant ordinarily does that for his purposes there is an unlimited supply of the several choices. In some of the experimental work on consumer preference, an error has been made by arbitrarily assuming that the proper preference was at the price differential that would make the choices disappear at equal rates. There are preferences that should be based on equal rates, as for example the choice of pre-packaging one way or another or handling in bulk, but in cases where the supplies of the choices are interrelated this should not be the case—unless, of course, if they are interrelated in such manner that the supplies are equal.

There are those in the field of agricultural economics who look upon themselves as the "hired men of agriculture." How meritorious this attitude is depends primarily on whether these economists are concerned with efficiency problems or with problems of individual or group equities and whether they are privately or publicly employed. In marketing problems involving equities the public researcher or administrator needs to guard against becoming the pleader for or against segments of society. In order to take an unbiased or indifferent attitude toward group equities in marketing research, and if marketing researchers vested with a public interest are to enjoy the influence accredited to scientists this must be done, it will be necessary to have a clear-the-market concept in controlled experiments studying consumer preference. The rates of disappearance must then be guided by this concept. This is something that can not be fixed immediately and for the long run because the relative production of choices normally varies and will vary again when and if the results of research in consumer preference become influential on the market. The degree to which there will be variation will depend on the differences in the elasticity of the supply of the several choices. An equilibrium should be established by the price structure so that it will not be necessary to have "clearance sales" for any of the choices tested. Unless the clear-the-market concept is a guiding criterion there will be a tendency on the part of the researcher in marketing inadvertently to fall into the trap of scarcity economics. It would then become a problem of finding out what volume and type of supply would bring the greatest net returns to agriculture despite negative effects on the rest of the economy. Action of this type would soon make a syndicated political issue out of the marketing research program. The attitude must

be taken that agricultural economists in public institutions and agencies are hired men of the public.

Merely to have reached an equilibrium between consumer choices is not always carrying the research far enough for an accurate test. Take as a hypothetical example a comparison of sell ng apples in boxes or baskets. Conceivably all apples could be sold either way, so it would be logical to assume that when equal volumes are moving in each of boxes and baskets the price differential is then correct. Some studies that should have been carried further have stopped at this point. In this situation the price differential would be correct only while the two alternatives existed. It would not follow that *all* the apples could be moved equally well in either method. If half of the apples disappeared in boxes and half in baskets it might be true that each customer had reached a "zone of indifference" as to which he would buy. This, however, would be extremely unlikely. It would also be possible that the experiment had segregated from the others those consumers who want apples in boxes rather than baskets, or conversely, and price was not a factor. This also would be unlikely and the probable situation would be somewhere between these two extremes, The incidence of this probability needs to be tested.

When the equilibrium of rates of disappearance has been found through the pricing mechanism the next thing to do is to *withdraw one choice* at a time alternately and see what happens to the remaining rates. If, by chance, the total volume of trade remains the same regardless of which choice is withdrawn, then the "zone of indifference" represents the general indifference of the consuming population. If the volume of trade falls for either choice there has been segregation of consumers and it would not be safe to say that it makes no difference, in this example, whether apples are sold in boxes at a certain price or in baskets at a certain price. Whether a choice should be maintained depends on the effect on the sales volume not only of the choices in question but also on other "lines" offered to the same customers.

For many purposes of prediction it would be desirable to analyze facts concerning the consumers who indicated their preferences both in the equilibrium period and at the periods of alternately withdrawn choices. Analysis of them should serve as a guide in setting up questionnaires for interviewing consumers. In general it is better to predict preference from instances of behavior but these

may be related to facts pertaining to consumers. It is also more valuable to obtain information that is less changeable even though the information might deal in the realm of opinion. For example, it would be more important to get church affiliation than it would political affiliation or perhaps even than how the consumer actually voted. Factors of importance in stratifying the consumer population, so that a more reliable expansion might be made from the sample of consumers whose behavior has been observed, might be found through the process of alternately withdrawing choices.

In some studies the fact that people need time to orient or condition themselves to a new idea has been overlooked. Suppose an entirely new type of choice is to be offered to consumers. It might then be more important to measure an acceptance trend over enough time to prove that adoption of the choice would or would not be economical. In research this trend could be studied as a byproduct of the method of alternate withdrawal of choices.

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MARKET AND MARKETING RESEARCH IN THE MIDWEST

EACH state is doing work in these fields. Regional projects are set up in connection with livestock, milk, eggs, potatoes, fruits and vegetables, and poultry (technological). In some cases regional funds are used to expand work on local problems with little or no attempt to coordinate the efforts in a solution of a regional problem. There is need for a much more thorough and well thought out over-all program as to the basic problems in each field. It is recognized that effective research is done by competent individuals working often on rather small problems. But it is also desirable that these individual problems fit into a comprehensive plan.

Basic problems may be classified: (1) the market; (2) the organization of the marketing system in performing its functions effectively and efficiently; (3) the organization of individual firms in performing their particular jobs efficiently and effectively; and (4) the development and application of improved technology.

1. *The market.*—This term is used to mean the quantitive and price aspects of an economy's sales of a particular good. We are concerned with the farm products and the products derived from

them in the 12 midwest states. Basically, we start in this area with grains, oilseeds, and forage crops as the major farming pattern with fruits, vegetables, tobacco, etc., as minor products for the region as a whole. In 1946 we converted these major products into animal products or sold directly as follows, in billions of dollars:

Meat animals	$4.6	Feed crops (chiefly corn)	$1.1
Dairy products	1.9	Food grain (chiefly wheat)	1.0
Poultry products	1.2	Oil-bearing crops	0.5

We need to know in detail all the factors which affect the market for these products and their principal subdivisions, e.g., cattle, fluid milk. By market we mean quantity and price considerations. The problem may be divided:

a. *General economic relationships.*—Price quantity relationships, income effects, distribution-of-income effects, general price level effect, competitive relationships, secular tendencies in relative demands, etc.

Much work has been done in this field, but much of it is now out of date. One can also criticize much of it as market research for undue attention to one phase of the problem viz., with price-supply relationships when the facts faced in the market are changes in the general price level, or with consumer incomes in the USA when the controlling factor may be a change in the international position.

b. *Market areas.*—To study the market one must know the size of the market area involved. This may be local or regional as for fluid milk; national as for beef; international as for wheat. An international market does not mean the whole world but only the areas in which the United States can actually sell. One must define the market area and its characteristics. For example, all our beef is sold within the United States but the market area for a particular class or grade of beef may be more localized.

c. *Market development.*—Consumer tastes change; new technology permits a product to be sold in a different form. These developments may be of minor importance to producers, as for example, a new pie crust mixture (which may be very important to the competitive position of a particular firm), or they may be very important. Important historical examples are refrigerator cars, vegetable shortening, and the rise in consumption of fluid milk. Economists should be alert to these developments and should be steadily evaluating them as they may affect situations in (a)and (b)

above. Thus the rise of vegetable shortenings apparently altered the demands for lard and refrigeration certainly changed the market areas for all perishable products.

The increased use of products in higher economic categories as consumer demands develop for them is in the interest of both producer and consumer. Some examples:

(1) Many consumers want better eggs than they can currently buy. Prevailing premium prices are evidence. The problem here is to develop marketing facilities which will act as the needed link between producer and consumer so as to satisfy adequately this market demand.

(2) Using dried skimmilk as a food is a higher order of use than feeding it to livestock. Not only technology but effective merchandising efforts are necessary to develop this use.

(3) On a broader scale shifting milk from manufactured to human use moves milk up to a higher category of use. Much of the reorganization in the country end of the dairy industry over a long period of years has been in response to this fundamental shift in market outlet.

Many other illustrations might be given. The basic point is that market research should aim at searching out any undeveloped market outlets which will shift products to a higher category of use. To effectuate the changes, much marketing research may be needed.

When the use of a product increases (other than in response to population growth) adverse effects are likely for competing products. So market research must also be alert to developments tending to push certain commodities down the scale of use.

2. *The organization of a marketing system.*—Between the producer and consumer is a complicated marketing system. For simplicity we include in this system all agencies in the area whether they perform merchandising, transportation, processing, or other functions. For different groups of commodities the details of the system vary although in each case it performs broadly similar functions. However, for convenience in research the various commodity systems can best be studied individually but always in the light of the general principles common to all.

"What functions must a market system perform?" and "How effectively and efficiently does it perform them?" are key questions.

Some important functions will be briefly mentioned. Filling in the details of a particular system and measuring its efficiency are problems for specialized research.

a. *Pricing functions.*—The most important function of any marketing system is pricing at every level of the system where title to goods is transferred. It is by response to prices that consumers register their opinions as to their relative demands for different kinds of goods. It is by prices that the basic market factors—supply and demand—are balanced. Evaluating the system of pricing should be the first object of systematic marketing research. Certain criteria of efficiency need to be set up and each system studied to see how well these criteria are met.[1]

After such an examination, one is in position to make suggestions for changes. Much research in milk marketing has centered on this problem. Formulas to guide public agencies in setting milk prices have been evolved. Some of them have broken down because the functions which prices must perform in a market were not clearly understood or the formulas did not allow for factors which would cause prices to vary so as to perform their functions.

The failure to provide a supply of the quality needed to satisfy a high level of demand may indicate a pricing system which does not reflect this demand back to producers. The University of Illinois research in egg marketing was set up to study this question.

A part of a pricing system is a system of market standards. Without such standards prices have no specific meaning. In analyzing the pricing system one should examine how well the standards in use really reflect the differences which users, either intermediate or final, really desire.

These illustrations point up the fact that evaluation of the marketing system should begin with the pricing functions.

b. *Risk functions.*—Investments in facilities or commodities create risks at every level of marketing. Risks are costs which must be covered if the people are to do certain jobs. Marketing systems develop ways of providing for these risks. It may simply be a wide margin or mark-up which will cover the risk involved. Fruit and vegetable markets illustrate this method. It may be the evolution of very large firms with large capital resources and stable retail price policies, as in tobacco. It may be the development of special market institutions for hedging as in the grain, cotton, egg, and butter markets. In any analysis of the marketing system these

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[1] For a tentative list of such criteria see L. J. Norton, *The Effectiveness of Market Mechanism for Adjusting Farming to Public Need,* Proceedings of the Sixth International Conference of Agricultural Economists, pp. 113–115, Oxford University Press, 1948.

particular devices need to be studied and evaluated. The existence of risk is a primary cause for the entrance of governments into the marketing field. The various systems of supporting minimum prices that have been evolved should be included in any comprehensive study of risk.

c. *Physical functions.*—In moving goods from producers to consumers many physical jobs are needed: assembling, transporting, processing, storing, distributing, display, etc. Marketing research in agricultural products has perhaps dealt too much with these rather than with the more fundamental pricing and risk functions. The logical order of analysis is (1) to determine the jobs to be done and (2) to study the system to find out the kind of firms developed to do them. A careful analysis may find that some link in the process is unnecessary or that some other type of agency can do it more effectively. The actual patterns are constantly changing. The researcher should discover these changes. He should evolve a standard which will permit him to evaluate them and when adequately qualified, even to suggest changes. Cases in point over the last 30 years are:

(1) The development of larger units in food retailing with all kinds of foods in one store often associated with the combining of retail and wholesale functions.

(2) The shift to paper containers in milk distribution with accompanying increased sales of milk in retail stores.

(3) The decentralization of the livestock market particularly for hogs.

Other students may wish to analyze the marketing system in terms of more than these three major functions. However, our general division into pricing, risk carrying, and physical functions will be found useful.

3. *The organization of individual firms.*—The marketing system is made up of a very large number of individual firms, some large and some small. For any analysis of detailed operating problems, the firm is the basic unit of study. However, in a logical program of research a systematic knowledge of the market and the marketing system should precede studies involving individual firms. In getting answers about the market or the system we must often, of course, use data from firms.

Work with individual firms may be of the following kinds:

a. Development of basic data as standards to measure efficiency in performing different functions.

b. Analysis of specific practices in particular firms, especially those which are introducing new methods.

Since the big costs of marketing are in retailing, work in this field should emphasize studies in that area.

4. *Technological research.*—Many marketing problems can only be solved by technological research. Some of this may reach back into the area of production. Examples are: Retail store sales of milk are based on the paper container. Marketing riper peaches apparently depends on a solution of the "brown rot" problem. Marketing better sweet corn depends on development of practical and economical methods to precool it at or close to the farms. Strengthening the competitive position of lard in comparison with the shortenings rests on development and promotion of more stable lards. The economist can point out problems based on market research and should be aware of technological changes and be in position to evaluate their effect marketwise.

Technological research by public agencies ought to be directed toward problems of general application rather than at specific problems of particular firms. A highly specialized product may be very important to the competitive position of a particular firm but such research on it can best be done in the firm's own laboratories. The paper milk bottle and the problem of stabilizing lard are examples of generalized technological research.

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SUMMARY OF PRACTICES AND PROCEDURE IN TEACHING MARKETING OF FARM PRODUCTS

IN assembling material which might be helpful in discussing the problem "Methods of Teaching in Agricultural Economics" to be used at one of the roundtable programs at Green Lake in the autumn of 1948, a questionnaire covering certain phases of teaching methods and practices was prepared and sent to all the land grant college departments of agricultural economics or marketing. Forty states returned reports. Their replies may be briefly summarized as follows:

A. *General*

Credits or hours in introductory marketing course

2 credits	2 states
3 credits	29 states

4 credits	3 states
5 credits	5 states
States giving graduate credit for this course as well as undergraduate	19 states
Prerequisites required	
Introductory course in economics	24 states
Junior standing	2 states
Sophomore standing	3 states
B. *Presentation of Subject Matter*	
Lectures over 80% of class time	9 states
Lectures not over 50% of class time	12 states
Average percentage of time used for discussion	⅓
Laboratory work utilized	13 states
Use of field trips	8 states
Formal student reports required	19 states
Use of mimeograph materials	32 states
Use of film strips	10 states
Use of textbook for course	38 states
C. *Size of Section Preferred*	
Sections not over 25 students	11 states
Sections 25 to 30 students	9 states
Sections larger than 30 students	5 states
D. *Division of Subject Matter*	
Over 50% of time devoted to descriptive matter	24 states
Over 50% of time devoted to functional aspects	16 states
E. *Examinations*	
Discussion questions exclusively	4 states
Objective tests 50% or more of total	20 states

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SAMPLING MEDICAL SERVICE CHARGES: A NEW APPLICATION OF SAMPLING METHOD

THE use of the "parity price" measure in the administration of government programs relating to farms and farmers places a heavy responsibility upon the agency which constructs the index numbers of prices farmers pay for the commodities they buy.

Since 1911, when the U. S. Department of Agriculture started to gather data on prices paid by farm families, there has been a continuous effort to develop such data and to use appropriate statistical procedures for obtaining and analyzing them and in constructing the index of prices paid.

Within the Department of Agriculture, the responsibility for gathering and summarizing the data that are used for computing the index of prices paid by farmers has been placed upon the Bureau of Agricultural Economics. The number of items on which price data are available has been expanded from time to time and at present most of the principal categories of farm family expenditures for commodities are represented in the index of prices paid. However, there are several types of services bought by farmers that are not in the index, and for which adequate data are not yet available. Medical service is one of the more noteworthy of these groups.

Expenditures for medical care are an important element in the farm family budget and this has long been recognized. A survey covering 1941, made by the Bureau of Human Nutrition and Home Economics of the U. S. Department of Agriculture, indicated that the families of farm operators spend annually about $370,000,000 for medical care, medicines, and drugs. This was nearly $60 per farm family, or 7 per cent of the average farm family budget.

In 1936, data on the fees charged for office calls and associated medical services were obtained by agents of the Bureau of Agricultural Economics in 19 states, covering the periods 1910–14, 1924–29, 1932, and 1935–36. Since then, the Department has not had the funds nor the personnel for collecting similar data on an annual basis. After the end of World War II, the Department has again investigated the problem of getting the information needed in the construction of annual index numbers of prices paid by farm families for medical services.

Measuring medical expenditures by farm families presents a number of difficulties. Many of these difficulties are inherent in

the nature of the expenditure patterns themselves. Heavy expenditures are often unplanned and arise from an accident or emergency operation. Broadly speaking, there are two general approaches to the subject. The first concerns surveying the farm families directly; the second would deal with doctors, dentists, hospitals, etc. that serve farm families. The technical design of sample surveys for either of these two broad groups is very difficult to work out. However, largely because of the variation in type and amount of medical care among farm families, it is believed that this question can best be approached through inquiries to hospitals and the medical profession. A survey plan was devised for Maryland and tests were made in that state to test the adequacy of the sampling procedures used and the workability of the schedules and methods.

The sample in the Maryland survey was designed for obtaining information by interviewing physicians, surgeons, dentists, hospital officials, oculists, and optometrists that would yield data from which state estimates could be made of the rates paid by farm families for selected types of general medical service. If such a survey were extended to a sufficient number of other states, data would become available for computing indexes of the percentage changes in the prices paid by farm families for all medical care.

In conducting the sample survey in Maryland, questionnaires were prepared for each selected type of medical service. Physicians and surgeons were asked to report the most common fees charged families for the ordinary types of services rendered. The questionnaire for dentists asked for charges to farm families for filling, cleaning, X-raying, and extracting of teeth. Hospitals, serving farm families, were asked to report on the cost of hospital rooms, salaries of registered and practical nurses, as well as charges for other common hospital services. Oculists and optometrists were asked the fees most commonly paid by farm families for eye glasses.

A separate sample was designed and used for each of the four types of questionnaires, (1) Physicians and surgeons, (2) Hospitals and nurses, (3) Dentists, (4) Oculists and optometrists. The basic pattern of the sample for each of the four surveys, however, was determined by the sample used for the Physicians and Surgeons Inquiry which therefore is discussed first and in more detail.

The 1942 Directory of Physicians and Surgeons of the American

Medical Association was used as a basis for selecting doctors to be included in making the survey. The first step was to eliminate, by using the medical directory, all doctors who limited their practice to special fields or excluded farm families in their practice, and also to eliminate physicians and surgeons practicing in the large industrial cities where the Bureau of Labor Statistics gathers similar information on medical services. The intention was to include in the universe of inquiry only those doctors who provided farm families with general medical care. Thus, from the medical directory a list of about 650 physicians and surgeons was obtained which satisfied this criterion of providing general medical care to farm families in Maryland.

This list of 650 doctors was arranged alphabetically by towns and by counties for each agricultural price reporting district in Maryland. Next the list was divided into two sections. The first section consisted of doctors in towns which had two or more physicians or surgeons, and the second section of the list consisted of doctors who were in towns which had only one physician or surgeon. It seemed necessary to make this separation because a slightly different sampling ratio was needed for each situation in order to represent adequately the state as a whole. The goal was to obtain about an 8 percent sample of doctors serving farm families and at least 50 reports as the minimum number needed for reliable state estimates. Actually a somewhat greater number of doctors' names was selected in order to compensate for the inability of interviewers to reach some doctors and to allow for refusals to answer. The sample ratio was computed by dividing 60 (the number of names desired) by the total list of 650 doctors previously selected. On this basis every eleventh physician or surgeon on the list was to be selected for interview. This sampling ratio was applied directly to the sub-list of doctors practicing in towns having only one physician or surgeon. The fifth name was selected and every eleventh name thereafter was chosen to be interviewed in the doctor survey.

In selecting doctors to be interviewed from the sub-list of those practicing in towns which had more than one doctor serving the farm public, it was necessary to modify this procedure somewhat in order to minimize travel and to assure that average fees obtained would represent the particular towns randomly chosen by the sample. A restriction was imposed that at least two doctors in each town selected should be included in the sample. The procedure

was to choose the eleventh name on the list and the one below it as a starting place. Thereafter every twenty-second name was chosen along with the next following name. Rules were adopted which assured that two doctors having separate practices would be selected in each town surveyed. The addresses of the doctors selected for interview automatically determined the towns which formed the basic sample for the surveys on other medical charges.

The sample for the hospital, dentist, oculist, and optometrist surveys was determined by the towns selected in the doctor's sample. Where a choice was to be made within the pre-selected town, the names of dentists, oculists, and optometrists were selected at random from the classified section of the telephone book. Data were also obtained from all general hospitals in the towns covered by the doctor's survey. The size of the sample in each town was made equal to the number interviewed in the doctor's survey. The interviews were conducted by a statistician from the Maryland State Office of the Agricultural Estimating Service at College Park and a statistician from the Bureau of Agricultural Economics working together.

Survey results indicate that in Maryland the rates charged farm families for medical service have not advanced so rapidly during recent years as have prices paid for most other items used by farm families for living purposes. The preliminary results in Maryland gave a 1947 index number of 164 percent of the 1910–14 base period, previously mentioned.

This survey did not attempt to measure the extent to which such services are used by farm families, but recent investigations by the Bureau of Human Nutrition and Home Economics indicate that farm families are having increased medical care. Moreover, doctors interviewed in this survey in Maryland said that farm families at that time had more money to spend on medical care than they did a few years ago, and that collections from farm families on bills had recently been above average.

Analysis of the results of the survey indicates that this sampling procedure may be expected to produce satisfactory data from which state estimates of the prices paid for individual services may be made, for use in the construction of an annual index number representing medical services.

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BOOK REVIEWS

Joint Committee Report on Extension Programs, Policies and Goals, U. S. Government Printing Office, Washington, D. C. August 1948. Pp. 72.

This is a report of a Joint Committee of ten, five appointed by the U. S. Department of Agriculture and five by the Association of Land-Grant Colleges and Universities in October 1946, with the following general objectives: (1) Appraise the services and experiences of the Cooperative Extension Service over the years; (2) study the important basic problems of cooperative extension work, particularly relationships with the U. S. Department of Agriculture and Land-Grant Colleges; and (3) develop definite recommendations as to how the Cooperative Extension Service can best meet the problems of the future.

The accomplishments of extension work during the one-third of a century of its operation are summarized in the first section of the ten-section report. The primary function of extension work in agriculture and home economics is education, and the report emphasizes this point. The proper performance of this function requires use of an increasing number of techniques in an ever widening range of subject matter. This entire section is a very modest but sound statement of the achievements of extension work. The section concludes with this significant statement: "In short, whereas extension has done much for people, it is what extension has helped people do for themselves that achieves the greatest results."

There is danger that this broader function—helping people learn to help themselves—learning how to solve their own problems—may be overlooked too frequently. The specific improved operating practices which can be appraised in terms of immediate and tangible results on the farm crowd out this broader objective. Moreover, there is a growing obligation to help farm people understand the complex social and economic problems—local, national, and international—that face them. It is in this field of work that so many agents, particularly the older agents, have the most difficulty. Many have difficulty developing and maintaining a well-balanced and complete service in their counties. A much more comprehensive program is needed today than was provided in the early years of extension work.

The Committee makes five specific recommendations regarding the relationships between the United States Department of Agriculture and the land-grant colleges and universities in connection with extension work: (1) To keep mutually informed on new developments quarterly meetings should be held between representatives of the Department and the Association of Land-Grant Colleges and Universities; (2) annual meetings should be held between the Secretary of Agriculture and an appropriate committee of the Association; (3) the Department and the colleges should reach agreements on responsibilities *before* new Department programs are launched which involve education in the States; (4) Department agreements with other State agencies involving education should be worked out in conjunction with the colleges; and (5) the Department and the colleges should give greater assistance in training State extension workers.

The Committee feels that despite some difficulties experienced in recent years in operating under the "Memorandum of Understanding" of 1914, the Memorandum is nevertheless an adequate statement regarding cooperative relationships between the Department and the State colleges in conducting cooperative extension work. If adhered to, all educational programs within the State for which the Department has a responsibility will be carried on through, or in cooperation with, the State colleges.

The perennial problem of the proper relationships of the Extension Service with general farm organizations is discussed in Section Four. The Committee concludes that, although close cooperation with general farm organizations is highly desirable, former operating relationships with such organizations are detrimental to the public interest. It specifically recommends that all legal connections and exclusive operating arrangements between farm bureaus and the Extension Service be discontinued, and that Extension Service officials and farm bureau leaders in the States concerned take the initiative in this matter. A dissenting opinion by one member of the Committee is also included in the report covering this point.

The Committee recommends full coordination of the three college functions—resident teaching, research, and extension. It believes responsibility for such coordination should be placed under one administrative head, and that each subject-matter program of the three should be combined into one department. This reviewer believes this is a sound recommendation, but realizes such coordina-

tion is far from achieved in many land-grant colleges for one reason or another.

The Committee believes that while subject-matter specialists are of great value to extension work, the specialized approach can, and frequently is, over-emphasized. In appraising the trends and outlook for extension, the Committee lists the following as the effects of technological progress: (1) A need for more knowledge of the use and maintenance of machinery; (2) an increase in the capital required for efficient farming and rural living; (3) a widening of the gap between efficient and inefficient farmers, and the resulting displacement of farm labor; (4) increased production, and hence need for greater emphasis on soil conservation and on marketing distribution; and (5) continuous changes in the home, with new opportunities and new problems for the homemaker. Other trends of particular importance to extension in the future are: (1) The need for rapid expansion in the field of conservation of natural resources; (2) the need for expanding emphasis on individual farm and home planning; and (3) the decreasing number of farm families and the increasing number of rural nonfarm families; and (4) the continued need for, and emphasis on, better rural health and rural educational services.

The Committee concludes that the present need for extension education among farm people is apparently far ahead of the capacity of extension to meet it, and that this should be a great stimulus to extension efforts. It calls for a careful sifting of demands and effective allocation of time and effort. Particularly great is the need for the extension type of informal, continuing educational programs. Extension's goal should be to maximize efforts on education, and guard against any tendency to become largely an emergency or administrative agency.

This Joint Committee report is an excellent statement of extension programs, policies, and goals. It should be read by every staff member of our land-grant colleges and universities. If the recommendations contained in the report are carried out effectively, extension can certainly expect a growing need for its services in the years ahead, and be confident that the Nation will profit greatly from its services.

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Rural Mexico, Nathan L. Whetten. Chicago: University of Chicago Press, 1948, Pp. xix, 671, XXIII Plates, Statistical Appendix, and Index. $10.00. Foreword by Manuel Gamio.

Rural Mexico is a scholarly work devoted to the understanding of the land of the author's birth. Professor Whetten, now of the University of Connecticut, spent his childhood in Mexico. This investigation was made possible by his appointment for three years as a member of our Embassy staff in Mexico City. One gets the impression that Professor Whetten has written with two sets of readers in mind, the Mexicans and ourselves. The result is an extremely well balanced book which ranks with the previous landmarks of analysis and interpretation of Mexico by our scholars: as, Simpson's *Ejido*, Tannenbaum's *Mexican Agrarian Revolution* and McBride's *Land Systems of Mexico*.

The study is divided into four major parts: population and geography, the relation of the people to the land, standards and levels of living and social institutions. A vast amount of information is included in the 91 tables in the text and the appendix of 41 tables. Professor Whetten has included a digest of the major published statistics on rural Mexico plus numerous presentations from hitherto unpublished data. The 20 page bibliography provides an excellent guide to the literature in both Spanish and English. Especially in his treatment of land tenure, the author uses a comprehensive review of previous studies to state the problem for his own work. The statistics on the results of the land reform program include the data for 1945. Throughout the study, one finds the insight that can come only to one who has travelled to the remote valleys and visited with countless people in their own tongues.

Rural Mexico is not only a competent study; it is an important one. It has great significance just because Mexico is beset with so many of the difficulties and problems that plague the world today. This era is undoubtedly the most revolutionary one of recorded history. No one can foresee the end but the Mexican Revolution of 1910 may well be considered marking the beginning of this series of social upheavals. Mexico is a vast laboratory of this violent age; a few of the more significant facts may be noted.

The Mexican Revolution antedated both the Russian Revolution and World War I; it was not a planned revolution at all, as Whetten points out so clearly. But once the people were aroused by the prospect of "Land and Liberty"—the old order was doomed.

The most dramatic and fundamental part of this revolution has been the confiscation of large estates and the re-distribution of land. This is only the beginning of social reconstruction; but the "fat is in the fire" as we say. One can argue the pros and cons of the Mexican land revolution, and Whetten presents the evidence and arguments with impartiality, but most of the arguments about whether or not the revolution improved conditions are simply comments after the fact. Efficiency of resource use is not a major question during a revolution, partly because property and security of expectations are demolished thereby, and partly because deeper issues are at stake, such as equitable distribution and human dignity and freedom. A comprehension of the Mexican Revolution is a valuable object lesson to all of us interested in rural and human welfare, not because revolutions are something to be desired, but because revolutions break out when no other methods of meeting human needs and aspirations have been devised.

Twenty-three percent of all the crop land in Mexico has been redistributed by the land reform program. Allotments have been given to 1.7 million persons out of a total population of 20 millions. Although we have heard much more about the grants to communities, the ejidos, the land reform program also resulted in a great increase in small individual holdings. Among the 1.2 million private holdings in 1940 about three-fourths were of less than 5 hectares (about 12.5 acres). Fifty-seven percent of the land holdings were on the ejidos. It is interesting to note that the land reform program was conceived initially as a way of giving workers a small plot of land upon which to live that they might earn most of their living from employment near-by. But the torrent once loosed cut through the very structure of land ownership, tearing great haciendas to pieces. Most of the ejidos are operated in tiny pieces with the individuals holding the rights to use specific pieces of land. Those fragments are not farmed well; for the most part these people have few tools and only the most primitive knowledge of farming. But the eighth of the ejidos farmed collectively have their troubles too, since the farming operations must be done by joint action. Students of farm management will find this part of Whetten's analysis especially interesting. If one compares these operations with those on the Russian collectives, he will be impressed by the strenuous efforts at democratic procedures in Mexico, even though an elected foreman makes a very poor boss.

Social reconstruction is complicated in Mexico, and in many of the other Latin-American countries by the "Indian question." The 1940 census of Mexico was taken in 50 tongues: Spanish and 49 Indian dialects. Our own country was "settled" by Europeans; Latin America was "conquered." The result was a feudal structure in which the Indians were slow to learn the language of their conquerors; furthermore the ideals of private property and individualism which sparked the liberation of European serfs had little relevance to the social life of the indigenous population. These are some of the consequences of conquest which remain in Latin America today. This conflict of cultures makes the problems and prospects of rural development in the Latin Americas more difficult, in many ways, than in the Middle East and Far East. In these latter areas poor peasants share the same culture with the more fortunate people.

It is hard for us to comprehend the poverty which still exists in Mexico. Two-thirds of the people are farmers of some sort. Forty-five percent of the people were classified as living in huts by the last census. Many of the so-called houses were little better, without chimneys or any other conveniences. Forty percent of the people have no beds, either sleeping on the dirt floors or on little platforms. Few people have access to good drinking water. About one in four have no shoes. Once this is realized it is easier to comprehend that an Indian is someone who lives like an Indian; i.e. in abject poverty. One can cease to be an Indian by putting on shoes and assuming some of the other characteristics of the upper classes.

One is tempted to say that all the dilemmas of economic progress in backward economics are found in Mexico. Where an agrarian revolution occurs, the peasants getting a small piece of land are most likely to grow something to eat. They eat better even though total agricultural production decreases. In a country like Japan this creates a food crisis in cities. In a country like Hungary this creates a crisis in international trade, as wheat for export is not forthcoming. In Mexico, a self-sufficient peasantry grows corn everywhere; this is the mainstay of their diet and the core of their natural economy of subsistence. Whetten's analysis of diets is illuminating and gives a commendable orientation for land utilization studies in backward economies. In the background of this study lurk all the thorny questions of economic development. How can food production keep apace of the increase in population? How can

a country become industrialized, so that the standard of living can rise? How can the needed capital be secured, where there is so little margin for savings?

The answers to those tremendous questions are not clear in Mexico. Furthermore, the projection of such questions upon a world plane make the answers still more difficult. Surely the solution all over the world cannot be to industrialize and purchase the needed food. It is the recognition of this fact which is making Neo-Malthusians out of so many people these days.

But if the answers aren't clear in Mexico, at least the way is now open for thoughtful consideration of the ways out. The ground has been cleared. The fate and hopes of the country seem to hinge on the possibility that the revolution may eventually energize the people in a way that a feudal society never could. In Whetten's concluding words: "The personal freedom enjoyed by the general population is probably the greatest achievement of the Mexican Revolution. In the long run, this may prove important enough to counterbalance whatever mistakes may have been made."

K. H. PARSONS

University of Wisconsin

Plowshares Into Swords, Arthur P. Chew, New York: Harper and Brothers, 1948. pp. xv, 221. $3.00.

The thesis presented in this book is that wars are caused by an unbalance between agriculture and industry. Industrial nations (except the United States) have access to food only by exchanging industrial products with agricultural exporting countries. But agricultural countries are industrializing themselves. In the process, tariffs and trade barriers are raised against the industrial countries. As a result, industrial countries are forced into imperialism in efforts to annex agricultural areas and re-establish the balance between agriculture and industry within their own borders. They beat plowshares into swords because "they have an overwhelming need for plows or more literally, for agriculture; it is for agricultural resources that they go to war."

This argument is developed in its various aspects in the first eleven chapters. A number of topics are discussed. Agricultural self-sufficiency is fostered in industrial countries as their export trade declines. The relation of population growth and world conflict is discussed. Here the author emphasizes the rapid growth in Euro-

pean population and the resulting top-heavy industrial structure. He quotes the early Veblen on war with approval and disagrees with Veblen's later views that the masses of the people have no interest or gains from imperialism. In his discussion of declining populations he suggests that reductions in the working population will complicate the problem of food procurement by lowering the production of those industrial goods that can be traded for food. No tables and few statistics are given.

In later chapters he discusses the position of the United States with high industrial tariffs and subsequent efforts of American farmers to develop a price system providing comparable benefits to agriculture. He deals with the separation of industrial Europe from agricultural America. In chapter XVI the author discusses export dumping, appearing to accept the idea as a necessary means of keeping the economic wheels turning. He does not discuss the possible repercussions in other nations. He deals with conservation and immigration as possible partial solutions of the agricultural-industrial imbalance. Finally he proposes two immediate alternatives and one long time solution to the problem.

The first solution is a system of much freer trading which he rejects as being politically impossible. The second alternative is world effort to provide forbearance in industrialization by agricultural countries and to provide security of food imports to the industrial countries. While the exact implementation is not specified, it might take the form of a series of industrial commodity agreements whereby industrial countries are provided guaranteed sales of their output. It is difficult to see much real difference between the two programs. The long run solution is an urban-rural balance within national boundaries all over the world, attained by industrializing agricultural countries and developing agriculture in industrial countries or by coalescing nations together.

Much of the discussion in the book is a somewhat different version of the have and have-not nation theories prevalent before World War II, couched in agricultural rather than raw material terms. This reviewer sees little justification for changing the terms of the argument. Coal, iron ore or oil may be considered far more vital than food in some nations.

Another phase of the argument that seems weak is that there is a limited demand for industrial products. He argues that as an agricultural nation builds textile mills, steel mills, machinery plants,

etc., its purchases of industrial products inevitably decline. There is no recognition of the possibility of increasing the sales for other types of industrial goods and advancing the level of living to satisfy an entirely new order of human wants. Of course, two world wars and a major depression have not furnished a favorable economic climate for developing real experience along these lines.

The problem of economic relations and world peace obviously is important. The role of the United States in leading the way in adjusting the conditions and terms of trade is clearly shown both in regard to trade barriers and price support policies. Mr. Chew proposes the difficult road of controlling the development of new competitive industrialization, and eventual uniform balance between agriculture and industry within each country. This would eliminate a large part of the gains from specialization and trade. This reviewer believes that there is more to be gained and still some hope of success in revising our actual trade policies to conform with our theoretical trade policies.

LAWRENCE W. WITT

Michigan State College

A Survey of Contemporary Economics edited by Howard S. Ellis. Philadelphia: The Blakiston Company, 1948. Pp. 472. $4.75.

A Survey of Contemporary Economics is an attempt on the part of "specialists" to review and appraise the developments which have taken place in their respective fields, during the past "ten or fifteen years." The impetus for the compilation and publication of these reviews was supplied by the American Economic Association's committee on the development of economic thinking and information. The recent developments in each of the foremost areas of specialization within the field of economics have been summarized by a competent authority and his appraisal in turn has benefited from the criticisms of two qualified and able critics. In the words of the editor the purpose of the volume " . . . is to provide the economist outside a particular field an intelligible and reliable account of its main ideas—both analytical devices and their practical application to public policy—which have evolved during the last ten or fifteen years."

In Chapter 1 Bernard Haley summarizes the developments which have taken place in the area of value and distribution. Much of this section is concerned with the impact of the indifference curve

approach on the theory of demand and with reporting a number of empirical studies bearing on the supply side. Haley's comments are more in the nature of summarization than of interpretation and appraisal.

Much of the discussion in Chapter 2 on employment and business cycle theory and in later chapters on monetary theory constitutes an attempt to fit the torrent of ideas and controversies unleashed by Keynes into the evolution of economic thought. Indeed, the doctrines of Keynes intrude at some point into nearly all of the resumes which are presented in the volume. Viewed in the aggregate these discussions seem to the writer to indicate that much mastication and perhaps regurgitation of the Keynesian concepts and their implications lie ahead before they can be regarded as thoroughly and finally digested.

In a lucid discussion of monopoly and the concentration of economic power, J. K. Galbraith traces the impact of the work of Joan Robinson and Edward H. Chamberlain on economic analysis. He concludes that the most important contribution of these two noteworthy books was "to emancipate the analysis of markets from the inadequate categories of competition and single firm monopoly." But in appraising the results of 15 years of renewed effort to unravel the problems surrounding monopolistic enterprises and to evolve a public policy adequate to cope with them, Galbraith concludes, "It is apparent that although the increment of knowledge has been considerable, both tasks have been attended by considerable frustration. The analytical task would appear to have failed because oligopoly by all evidence the ruling market form in the modern economy has not yielded to the kit of tools long employed for the analysis of the competitive market. . . . It is the essence of the oligopoly solution that any individual can effect the solution. The analysis therefore had to take on a wholly unmanageable burden of assumptions as to how each participant in the market would behave."

Wassily Leontief's review of the work of the econometricians should be welcomed by the non-mathematician who has found himself puzzled by their manipulations. Leontief explains that the function of statistical analysis in application to econometric research is "that of an intermediary between a general theoretical hypothesis and the directly observable facts." He suggests that the outstanding developments of the last years lie primarily in the realm of methodology rather than in the direction of factual analysis, and then adds

"certain signs seem to indicate that this phase is now drawing to its close and that the years immediately ahead will witness new accomplishments in fields of applied studies."

The book ends with a peppery and thought provoking summary by David McCord Wright on the prospects for capitalism. If after dwelling through much of the book upon the seemingly overwhelming problems confronting our "capitalistic" system one is led to despair of its future, Wright does a masterful job of dispelling the gloom. He states that he cannot see that capitalism is suffering from any basic functional weaknesses in the sense of immutable laws preventing it from working. While he agrees that capitalism's future depends upon intelligent policy, Wright concludes, "It is difficult to escape the conclusion that under the present conditions capitalism, economically speaking, once more makes sense. In the light of world conditions what we need now is saving and production, and what can do a better job in these respects than capitalism?"

The science of economics, like the intricate economy whose functioning it seeks to analyze, has sought a "gain in product from the division of labor." But if it is to be fruitful exchange must accompany specialization. One can reasonably doubt that there has been a sufficient exchange of ideas among those working in the highly specialized areas within economics. Because they are without exception remarkably intelligible, considering the complex analyses they treat, these surveys are particularly well fitted to facilitate such an exchange of thought. *A Survey of Contemporary Economics* should be especially useful to the agricultural economist interested in catching up on what those working in other branches of economics have to offer.

RAYMOND R. BENEKE

Iowa State College

Conservation in the United States, A. F. Gustafson, G. H. Guise, W. J. Hamilton, Jr. and H. Ries (Cornell University). Comstock Publishing Co., Ithaca, N. Y., 3d edition, 1949.

Conservation in the United States is the third edition of a textbook that was first published ten years ago. It describes the extent and use of our natural resources, and as the title implies, gives particular attention to future supply-demand relationships. The book is interestingly written, well-organized with a good index, and enlivened by more than 250 maps, charts, and illustrations. Many of the pho-

tographs were taken by the authors and contribute to the impression that this book is a personal account of the conclusions reached after many years of study and observation.

Following a brief introduction and a chapter devoted to the development of conservation movements in this country, the book is divided into four sections written, apparently, by the four authors in the order in which they are listed on the title page. The first section deals with soil and water resources; the second with forests, parks, and grazing lands; the third with fish and wildlife; and the last with mineral resources. The chapters pertaining to soil resources describe the geologic origin of soils, the distribution of soil types in the United States and the related types of farming, the nature and extent of soil depletion and erosion, and the various methods and programs for soil conservation. In a general way, this treatment of soil resources characterizes the discussion of the other resources as well. In each case, the authors present an inventory of the resource, the uses for which it is valuable, the extent of its depletion, and the possibilities for its conservation. The result is a book adapted for general use in college-level courses in land economics or resource conservation.

The principal shortcomings of this book are those of omission. In its 512 pages—approximately 100 pages more than in the first edition—the authors discuss a great variety of subjects, frequently in some detail. As a consequence, certain topics are not treated as fully as some readers may expect. The 21 pages devoted to western range resources, for instance, contrast with the 41 pages describing fish and fisheries, and the 52 pages relating to game, fur, and other wildlife resources. Little or no attention has been given to such land-use programs as the submarginal land purchase and resettlement programs, rural zoning, land-use planning, and the AAA incentive programs for soil improvement. There is no discussion of land as space, or of the land requirements for transportation and urban uses.

The authors are primarily interested in the physical aspects of resource utilization, but it would seem that a discussion of conservation requires more than passing reference to property rights. Arid-region water resources, for instance, are adequately represented as a scarce and valuable resource, but little attention is given to the elaborate legal doctrines by which those resources are allocated, used, and conserved. Comprehensive treatment of conservation

also seems to demand some mention of our most important resource—people—and the resource problems resulting from population growth and distribution.

By treating the various natural resources successively and independently, the authors have avoided—and failed to answer—some of the most troublesome questions of conservation. By one definition at least, conservation is a rationing process involving a choice between dissimilar alternatives. Within limits it is not possible to save one resource without increasing the burden on others. This book competently demonstrates that we should preserve our soil, water, trees, and minerals, but it does not indicate how we are to warm our homes without using coal, fuel wood, natural gas, petroleum, or some other natural resource. In discussing the destruction of agricultural land in strip-mined areas, the authors come close to disagreement because they are considering soil resources in one context and minerals in another (p. 168 f., and p. 434). The fact that "best land use" implies alternative possibilities which must somehow be weighed and compared by a common standard of evaluation is inadequately acknowledged.

An economist will note that this entire book on conservation makes only casual reference to the economics of resource utilization. In discussing forestry, for instance, there is no mention of the time required to produce a timber crop, or the compounding of interest, taxes, and other costs with which a forest owner must reckon, or the various reforms in forest taxation which have attempted to make timber growing economically feasible. The possibility of conserving forests—or any other resource—will often depend on such economic considerations, or upon the fact of public ownership, public expenditure, or police power regulation. These elements are no less important than physical and technological factors in determining the use and conservation of our natural resources.

C. W. LOOMER

University of Wisconsin

Forest Farming and Rural Employment, Charles H. Stoddard, Washington, Charles Lathrop Pack Forestry Foundation, 1949, Pp. 29.

Forest farming has been suggested at various times as a means of (1) increasing total timber production, (2) securing better forest

management on private lands, and (3) providing employment for rural people. This study presents an excellent analysis of the opportunities for and the limitations of forest farming.

The forest farm is defined as "a unit of land and timber with a combination of tillable land, forest growing stock, and capital equipment sufficient to sustain full-time employment with forestry as the major activity, for one family, with a minimum of two men of working age. A full-time forest farm would provide two men 250 days of forest work a year with subsistence farming incidental thereto."

It is estimated that a full-time family-type forest farm would require an annual cut of about 500 cords or 330,000 board feet of logs where the workers cut, skid and haul the timber. Where the workers do not skid or haul their cut timber, an annual cut of 750 cords or 500,000 board feet is required. If a sawmill is operated in conjunction with the logging enterprise, an annual output of 150,000 to 200,000 board feet will provide two men with full employment. These production requirements necessitate minimum forest farm areas of 1,000 to 2,000 acres (800 to 1,500 acres if a sawmill is operated) in the northern Lake States and areas about a third less than this size in the South. Estimated capital requirements for a full-time forest farm range from $25,000 to $70,000.

The author's analysis is based largely on case studies made in northwestern Wisconsin and in southwestern Arkansas. He uses these data to indicate that forest work provides a promising source of rural employment. He also examines the financial possibilities for successful forest farming in these areas and finds that it can be a profitable business. At the same time, however, he concludes that the prospects for forest farming are limited by a number of important factors. Among these limiting factors are listed: the scarcity of available lands adequately stocked with forest growth, high capital requirements, lack of managerial talent, lack of interest and incentive for forest farming in areas where stumpage is readily available from other private or from public lands, and the relative inefficiency of family-sized operations as compared with large-scale commercial logging.

The importance of these limiting factors leads the author to conclude that "it seems unlikely that full-time forest farming will take a large place in the rural economy of either of the regions studied. Part-time forest employment to supplement other farming ac-

tivities appears more applicable to the needs of the resident population and the prevailing level of social and economic development."

A number of public measures now in effect and designed to foster the advancement of forestry by small owners are briefly discussed in the final section. While the author is appreciative of the results achieved, he argues that "the various public programs have barely scratched the surface" in getting small operators interested in actually practicing forestry. To remedy this situation he argues that the public aid programs could and should be strengthened by offering "complete forest management service" to small and nonresident owners.

RALEIGH BARLOWE

Cooperative agent, Michigan State College and Bureau of Agricultural Economics.

Historical Sociology: Its Origin and Development. Theories of Social Evolution from Cave Life to Atomic Bombing. Harry Elmer Barnes. New York, Philosophical Library. Pp. x & 186. $3.00.

The well known historian of social ideas presents here a new cross-section of the history of social thought. He surveys the kinds of interrelationships, which have existed between sociology and the various concepts of history, such as Parallelism, Diffusionism, Determinism, etc. Moreover, he passes judgment upon many of such systems, rejecting the following two ways of looking at these problems: (1) The "skepticism" of Hobhouse and Ginsberg, who for example deny any interrelationship between economic structure and form of government and who, Barnes says, divide the forms of life of primitives arbitrarily and obtain from their studies what they had assumed at the outset in their preliminary classifications (p. 57); (2) The constructions of Spengler—a revival of romantic organicism (p. 106); Toynbee—an uncritical "Theodicy" (pp. 107f.); and Sorokin with his subjectively constructed categories and his attempt "to measure the immeasurable" (p. 112). In contrast to such persons Barnes finds merit in Howard Becker's work in the history of methodology (p. 3), Briffault's comparative method based on empirical material (p. 90), Max Weber's ideal type method (p. 60), and Boas' combination of parallelism and diffusionism (p. 75).

One might expect in a book which deals with so many theories that many of them would be incorporated incorrectly into the

historical sequence. But actually one can only find two such mistakes: (1) Ranke and his school (p. 12) have actually been of no importance in the development of sociological thinking. Rather this school has recognized only the existence of a history of foreign politics or insofar as they have taken the existence of social phenomena into consideration they were explained as caused by international relations. By so doing this group has actually hindered the development of a sociological thinking in Germany; (2) Bachofen was of far greater importance than appears in this book (p. 86) since he combined German Romantic interest in the original and often irrational feeling of people with parallel development and by that way has been of great influence on such persons as Frederic Engels and Karl Marx. Except for contesting these two points the reviewer must praise the correctness of the historical explanation and of the methods recommended. Especially is Barnes right in insisting that historically structured sociological systems are competent insofar as they are based on empirically collected material, systematized according to "ideal types." Barnes likewise is right in arguing that the latter may be used only if they are considered auxiliary constructions rather than metaphysical entities which some social theorists claim them to be. Actually, as Barnes points out, such "entities" are of purely subjective character.

PAUL HONIGSHEIM

Michigan State College

Report of the FAO Mission for Siam, Food and Agriculture Organization of The United Nations, New York: Columbia University Press, 1948, Pp. 125. $1.50.

In this report, which was a result of three months intensive study of the economic and technical problems involved in the development of the agriculture and forest resources of Siam, the Mission specialists jointly present their recommendations regarding (1) Agricultural production, (2) Irrigation, (3) Control of rinderpest, (4) Forestry, (5) Economics of agriculture, (6) Agricultural statistics and (7) Agricultural services. To the agricultural economists, the chapter on Economics of Agriculture is particularly interesting. Here the investigators firmly grasp the importance of the rice economy of Siam, properly analyze it in the order of "Production Problems," "Marketing and Distribution of Rice," "Agricultural Credit," "Land Tenure" and "Co-operative Program"; and finally conclude with a "Plan of Agricultural Development."

The recommendations, 128 in number, are too numerous to quote in length. By and large, they are technical in nature. For this reason, however, they seemed to lack a clear-cut general outlook. The Mission recommended many things that would apply equally to almost any country without inquiring adequately into the causes of the present situation. The Mission also tended to avoid issues that involve political and social complications. For instance, it is no secret that the financing of the suggested program of agricultural development counts heavily on the profit from the export of rice under the monopoly of the Siamese government. The Mission, however, tried not to commit itself to the export monopoly as a system. It said that it does not feel qualified to advise upon such a policy.

At any rate, the programs of rice breeding, of fertilizer experiments, of rinderpest control, etc., are undoubtedly desirable; but if the programs had to move onto a social level such as distributing irrigation water or providing low-cost credit for tenant farmers, the reviewer feels that some of the recommendations would need further analysis.

B. K. SHAO

University of Wisconsin

Agricultural Extension Education in Poland, 1918–1939, Boleslaw J. Przedpelski, New York: King's Crown Press, 1948, Pp. x, 139.

The author states in his introduction that one of the pertinent objectives for this brief work is that of acquainting the rural worker with the Polish Educational Agricultural Movement that occurred between the two wars. This he proceeds to do on the descriptive level with great economy. The work is initiated with a brief historical summary of Poland and Polish agriculture, with emphasis on the various partitions and the eventual founding of the modern Polish State. Succeeding chapters are devoted to continued brief treatments of agricultural organizations in Poland; Chambers of Agriculture, units of agricultural self-government which are given central importance in agricultural adult education; the relationships of such Chambers to agricultural colleges and educational training centers for rural workers; general problems related to the development of agricultural extension education; a summary of statistics about Polish extension work; and a final chapter of summary comments with several references to the philosophy of extension work as it exists in the United States.

The core of this work is the descriptive treatment of the organizational structure of Polish Extension education, with the Chamber of Agriculture as the principal functional unit. The author points out the democratic aspects of this self-governing local unit centered in each province, with each province consisting of eight to twenty-seven counties. On the county level extension work was handled by general purpose voluntary agricultural organizations. Problems connected with such an organization included the lack of national and local integration, the weak relationships with agricultural colleges, and the difficulty of training and maintaining properly trained personnel. The principal educational method is described as that of the organization and management of small farms for demonstration and training purposes.

The author agrees with American students in that extension work is a socio-educational process. However, since this treatment is largely given to organizational structure, the reader may look in vain for more portrayal of the dynamic social and economic aspects of the Polish system which influenced people and local institutions. As a result, one tends to be lost in the organizational complex. A case treatment of a typical extension situation, for example, would have been helpful. Yet, since increasing interest is manifested throughout the world relative to extension work with rural people, this work adds, in spite of its brevity, to the knowledge with respect to adult education programs in rural areas.

PAUL A. MILLER

Michigan State College

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*Whetten, Nathan L., "Rural Mexico," Chicago: University of Chicago Press, 1948. Pp. 671. $10.00.

NEWS NOTES

The American Institute of Cooperation is conducting two workshops at the University of Wisconsin, Madison, just preceding the institute's annual summer sessions, August 22 to 26. The first, from Aug. 8 to 19, is for teachers on a graduate level with Professor E. A. Perregaux of the University of Connecticut as chairman, and Frank Robotka of Iowa State College discussion leader. The second, from Aug. 15 to 19 is for extension workers with Professor W. H. Dankers, of the University of Minnesota, as chairman and Professor L. A. Bevan, Director of Extension at New Hampshire discussion leader.

A Southern Regional Summer School in Agricultural Marketing will be held at North Carolina State College, Raleigh, from June 16 to July 29, 1949. With the assistance of the General Education Board, ten fellowships for graduate students and ten scholarships for undergraduate students have been made available. Professors Marvin A. Schaars of Wisconsin and Geoffrey Shepherd of Iowa will be visiting faculty members. Special lecturers also will be invited to participate.

A number of administrative changes have been made at Michigan State College. Dr. Herman J. Wyngarden, Head of the Department of Economics, will become Dean of the School of Business and Public Service on July 1, 1949. On the same date, the Section of Agricultural Economics is to be transferred to the School of Agriculture to become part of a new department, which is also to include the Department of Farm Management.

The Department of Economics is to be transferred from the School of Science and Arts to the School of Business and Public Service.

The New York Milkshed Price Committee submitted its report on the pricing of Class I-A milk at a meeting at Syracuse, New York, Feb. 21, 1949. Copies of the complete text of the report of the New York Milkshed Price Committee are available upon request from Dr. C. J. Blanford, Market Administrator, New York Metropolitan Milk Marketing Area, 205 East 42nd St., New York City. Members of the committee were appointed by Dr. Blanford from Cornell, University of Connecticut, University of Vermont, New York University, Pennsylvania State College, St. Lawrence University, and Columbia University. They worked on the report from November, 1947 through January, 1949. Dr. F. F. Hill, Professor of Land Economics, Cornell University, was chairman.

A bulletin recently released by the Bureau of Agricultural Economics is the first publication to give a complete statistical series of estimates of bearing fruit acreages by crops and by states. It covers the years 1919–46 and is the result of several years' research in which available data were supplemented with additional surveys to arrive at reliable estimates.

Statisticians in the Bureau of Agricultural Economics have undertaken an investigation of the problems of estimating local-market supplies of vegetables for metropolitan areas. The Bureau's present estimates of commercial vegetable production do not cover all of the local-market segment of this production.

The students in the Departments of Agricultural Economics and of

Agricultural Administration at Mississippi State College have organized a student section of the American Farm Economic Association. The officers are: W. O. Davis, president; I. T. Jones, vice-president; R. E. McCollum, secretary-treasurer; and B. D. Jordon, reporter. Professor John C. Redman of the Department of Agricultural Economics is faculty advisor.

The Division of Field Crop Statistics of the Bureau of Agricultural Economics has begun the basic work of setting up the nation-wide wheat acreage survey which is to be made in June.

Ernest Ahrendes has returned to Montana State College after spending several weeks at Kansas State College for the Bureau of Agricultural Economics in studying the economics of feeding wheat to livestock.

John F. Alexander, working on a rental arrangement study; and John R. Shillinglaw and J. A. Smith assisting with a regional potato marketing project, have been added to the staff of the Department of Agricultural Economics and Rural Sociology as Assistant Agricultural Economists at Clemson Agricultural College. They are February graduates of Clemson.

Clifford Alston, Extension Marketing Specialist, University of Arkansas, is working toward a M.S. degree in business management at Cornell University.

Keith W. Amstutz, who completed his work for a M.S. at Purdue in February, has accepted a position as fieldman in the Illinois Farm Bureau Farm Management Service.

M. E. Andal, Agricultural Economist, Department of Agriculture, Ottawa, was the recipient of an Agricultural Institute of Canada scholarship and for the past year has been on leave of absence at Michigan State College where he has been taking graduate work.

Miss Elna Anderson, an Agricultural Economic Statistician, who had been on the staff of the Bureau of Agricultural Economics in the Division of Statistical and Historical Research for 26 years, died February 13, following a fall in her home in Alexandria, Va.

Mr. Olav V. Anderson, formerly with the Bureau of Agricultural Economics, has been appointed a member of the staff of the Fats and Oils Section, International Commodities Branch, Office of Foreign Agricultural Relations.

William Barr, Associate Professor of Farm Management, Pennsylvania State College, is on leave completing requirements for a doctorate in farm management at Cornell.

W. K. Bing resigned as Associate Professor at Kansas State College to accept a position with the Bureau of Agricultural Economics, Washington, D. C.

William Black has been employed by the North Central Regional Dairy Marketing Committee, and is stationed at the University of Wisconsin, Madison. Professor Geoffery Shepherd is chairman of the regional committee.

M. C. Bond began sabbatical leave from Cornell University February 1. For two months he traveled through southern U. S. and Mexico and studied marketing for fruits and vegetables. He began work April 1 with the Federal Extension Service in Washington, D.C.

A. J. Boudreau, formerly on the staff of the Economics Department of the Superior School of Agriculture at Ste. Anne de la Pocatiere, Quebec, has been appointed a member of the Federal Civil Service Commission at Ottawa.

Glenn O. Bressler has returned to Pennsylvania State College where he will be a member of the staff of the Poultry Department. He has completed requirements for a Ph.D. degree in farm management at Cornell.

Royal Jay Briggs, head of the Department of Social Sciences at Central Missouri State Colleges, Warrensburg, Mo., has completed the requirements for a Ph.D. at the University of Missouri.

Henry M. Brown has transferred to the Washington office of the Bureau of Agricultural Economics from the Agricultural Estimates office at Raleigh, North Carolina. He is working on estimates of cotton and other fiber crops.

Alvin G. Carpenter, Extension Economist, has been transferred to administrative work as Assistant Extension Director at the Utah State Agricultural College, Logan.

L. Wayne Cochran, former Research Assistant at the Giannini Foundation, University of California, has joined the staff of the Citrus Fruit Division, Fruit and Vegetable Branch, Production and Marketing Administration, United States Department of Agriculture.

T. K. Cowden, Vice-President of the American Farm Economic Association, has accepted an appointment as head of the new Department of Agricultural Economics, Michigan State College, effective about May 1, 1949. Dr. Cowden has been Director of Research, American Farm Bureau Federation, for the past six years.

L. C. Cunningham will be in Chicago during his sabbatical leave from Cornell University from February 1 to July 1. He will make an economic study of the commercial feed industry.

Subhas Dahr has completed requirements for a Ph.D. degree in land economics at Cornell University. He will work with FAO in Washington, D. C. for a few months before returning to India.

Herrell DeGraff has taken an eight month sabbatical leave from Cornell University. He is in Mexico studying agricultural conditions for the Rockefeller Foundation.

T. E. Doak has accepted the position of Assistant Dean of the College of Agriculture and Assistant Director of Experiment Station, University of Missouri. Mr. Doak has completed requirements for a doctorate in prices at Cornell University.

Ralph Eastwood, who has been with the Farm Credit Administration, Washington, D. C. has accepted a position with the Cooperative Grange League Federation in Ithaca, New York.

Marven Farrell, who recently completed work for Ph.D. at Harvard, has joined the staff of the Economics Department, Ontario Agricultural College, Guelph.

Rudolf Freund has joined the staff of the Department of Agricultural Economics on a joint basis with the Division of Social Studies, University of North Carolina. Dr. Freund will teach courses in agricultural policies,

land tenure, and agricultural industries. Dr. Freund received his undergraduate and graduate training in Germany and was associated with the University of Virginia prior to accepting a position at N. C. State College.

Dr. Charles D. Hyson and Mr. Ayers Brinser, until recently on the Economic Staff of the Federal Reserve Bank of Boston have joined the Agricultural Marketing Research Staff of Harvard University.

Milton C. Gay retired as economist in charge of the Fruit and Vegetable Section, Cooperative Research and Service Division, Farm Credit Administration on January 22. Mr. Gay was for many years extension marketing economist in Georgia and later the southern representative of a large-scale cooperative marketing fruits and vegetables.

Sidney Gershben has joined the staff of the Bureau of Agricultural Economics, Washington, and is assigned to the Division of Statistical and Historical Research, Fats and Oils Section.

Charles M. Hardin, of the Political Science Department of the University of Chicago, will serve as a special consultant in the Office of the Secretary of Agriculture during April, May, and June, 1949.

Clifford M. Hardin has been appointed Director of the Michigan Agricultural Experiment Station, effective July 1, 1949. He has been assistant director for the past year, and previously had been Chairman of the Section of Agricultural Economics.

V. B. Hart, Cornell University, has been appointed by the Secretary of the Treasury as a member of the National Agricultural Savings Bond Committee.

Cecil B. Haven has accepted a position of Assistant Professor in Agricultural Economics at the North Dakota Agricultural College. He is teaching courses in farm management and production economics and is in charge of research in the same field. He has been granted leave for the spring term of 1949 to complete his Ph.D. thesis at Iowa State College.

Harry C. Hensley retired as principal agricultural economist in the Fruit and Vegetable Section, Cooperative Research and Service Division, Farm Credit Administration, on February 1, 1949. Mr. Hensley for several years served as county agent, district agent, and extension economist in marketing in Missouri.

Louis F. Herrmann has recently returned to the Bureau of Agricultural Economics from five years on the staff of the National Cooperative Milk Producers' Federation. Dr. Herrmann is in charge of research on dairy and poultry marketing in the Division of Marketing and Transportation Research.

F. F. Hill, head of the Department of Agricultural Economics, Cornell University, was in England during January studying the agricultural program of the United Kingdom for the Economic Cooperation Administration.

Asher Hobson, University of Wisconsin, was recently elected Chairman of the Board of Trustees of the American Institute of Cooperation, succeeding Dean W. I. Meyers of Cornell.

M. N. Huda has completed requirements for a Ph.D. degree at Cornell. He plans to obtain training with the Bureau of Agricultural Economics in Washington, D. C. before returning to Pakistan.

Alfred H. Johnson has been appointed Assistant in Research in Agricultural Economics, Rhode Island State College. He is working on Egg Marketing.

Neil W. Johnson, recently Assistant Head of the Division of Farm Management and Costs, Bureau of Agricultural Economics, was appointed Special Assistant to the Administrator of the Agricultural Research Administration in charge of the new Central Project Office of the United States Department of Agriculture.

Paul E. Johnston, University of Illinois, has been granted leave of absence and has joined Overseas Consultants Inc. to aid in a study of economic conditions in Iran. He is in charge of a group of five agricultural men who arrived in Iran February 8 for four months.

J. R. S. Jorgens, who took graduate work at Washington State College, has joined the staff of the Economics Division of the University of Alberta, Canada.

M. S. Kendrick, on leave from Cornell University until September 1, is doing research and writing in taxation.

Walter E. Larmie has been appointed Assistant Extension Instructor in Marketing at Rhode Island State College. He is working on a cooperative project on the marketing of fruits and vegetables.

Marc C. Leager, for twenty years a member of the staff of the Basic Division, died on December 6, 1948. For the past several years Dr. Leager had been a joint member of the Department of Agricultural Economics and the Division of Social Studies, University of North Carolina. His field of interest was farm finance.

Myron W. Madison, Illinois '39, has joined the staff of the University of Illinois as first assistant in agricultural economics. He has been a fieldman in the Farm Bureau Farm Management Service and will help coordinate the work of the fieldmen in his new position.

James G. Maddox has been appointed to the staff of the American Basic Economic Corporation, which is financed by Nelson Rockefeller and Associates, to assist in the development of a habilitation loan program in South America, beginning in Venezuela.

John N. Mahan resigned from the Department of Agricultural Economics, University of North Carolina, to accept a position with the Tennessee Valley Authority. Mr. Mahan was a joint employee with the Bureau of Agricultural Economics on a regional dairy marketing research project.

W. W. McPherson, who has been pursuing graduate work at Harvard University, has joined the staff of the Department of Agricultural Economics of North Carolina State College. Mr. McPherson was formerly an employee of the Bureau of Agricultural Economics. He will divide his efforts between teaching and research in farm management.

W. I. Meyers, Dean of Agriculture, Cornell University, has accepted an appointment to the board of trustees of the Carnegie Institution of Washington, Washington, D. C. Dean Meyers is also chairman of the National Agricultural Savings Bond Committee.

Wm. H. Nicholls of the Department of Economics, Vanderbilt University, delivered on March 21st the first address before the newly organized Social Science Seminar at Mississippi State College.

James Miles, Associate Economist, Marketing Research, Clemson Agricultural College, is working on a doctor's degree in marketing at Cornell University.

E. G. Misner of the Department of Agricultural Economics, Cornell University, is on leave.

Clyde Mitchell has resigned from his position as president of the New Korea Company and is now at Harvard University preparing a report and analysis of the program developed under his administration, which sold back to the farmers of Korea 1,500,000 farms that had earlier been taken over by the Japanese Development Company.

Dr. J. L. Paschal has rejoined the staff of the Bureau of Agricultural Economics, with headquarters at Fort Collins, Colorado. He recently spent 6 months in Alaska and is now engaged in a study of phosphate fertilizers in Western States.

Reed A. Phillips has returned to the Bureau of Agricultural Economics, Washington, after an absence of several months. He heads the research on marketing of livestock in the Division of Marketing and Transportation Research.

Clarence E. Prentice has been appointed assistant professor (Extension) at Michigan State College. He will specialize in grain, bean, and sugar beet marketing. He was formerly county agent in Sanilac County, Michigan.

A. E. Richards, Principal Economist, Economics Division, Dept. of Agriculture, Ottawa, is a member of the Canadian delegation that will be meeting for a period of some months at Annesy, France, in connection with an extension of trade agreements originally drafted at Geneva and Havana in 1947.

Marvin A. Schaars, University of Wisconsin, will be on the staff of the North Carolina School of Agriculture and Forestry, Raleigh, for the summer session teaching two courses in agricultural marketing.

A. Z. Sheira, on leave from the Bureau of Agricultural Economics, Ministry of Agriculture, Cairo, Egypt, completed his M.S. degree in agricultural policy at the University of Illinois, and is continuing his graduate work in Agricultural Economics at Cornell University.

Edward J. Smith, formerly graduate assistant, has accepted a joint appointment with the Wisconsin Agricultural Experiment Station and the Bureau of Agricultural Economics, and will study the farm management problems in making and utilizing grass silage.

Thomas D. Spivey has transferred from the Bureau of Agricultural Economics, Washington, to the Tobacco and Tropical Products Division, International Commodities Branch, Office of Foreign Agricultural Relations, where he will work on statistics of tropical products.

Hugh L. Stewart has been appointed Assistant Head of the Division of Farm Management and Costs, Bureau of Agricultural Economics. This is in addition to his leadership of the Western Agriculture Section of the Division.

Proctor Thompson, Research Associate in Agricultural Economics at the University of Chicago, will join the faculty as Assistant Professor of Economics and Education, beginning in October, 1949.

Ralph D. Tompkin has joined the staff of Iowa State College after completing requirements for a M.S. degree at the University of Illinois.

A. H. Turner, formerly Director of Research, Department of Cooperation, Province of Saskatchewan, has joined the Economics Division, Department of Agriculture in Ottawa, where he will have charge of marketing research.

F. L. Underwood, formerly of Virginia Polytechnic Institute, has joined the staff of the Department of Agricultural Economics at the Oklahoma Agricultural and Mechanical College, Stillwater, and is now doing teaching and research in farm management.

Richard Wheeler, in charge, and W. Herbert Brown and Ernest N. Gould are the research staff working on the project in Dairy Farm Management under a grant from the Charles H. Hood Foundation at Harvard University. The project has recently been expanded to include a study of dairy-woodland combination farming in the farm-forest margin.

Clyde Z. Willis has transferred to the Washington office of the Bureau of Agricultural Economics from the Agricultural Estimates office at Raleigh. He is working on estimates of peanuts.

Martin Young has returned to the Fruit and Vegetable Branch Production and Marketing Administration, USDA, and has been assigned to the Dried Fruit Division. He recently returned from two years in Korea where he was Chief and later Adviser to the Korean Chief of the Bureau of Agriculture in Kyong Sang Namdo Province.

MEETING OF THE EXECUTIVE COMMITTEE
CLEVELAND, OHIO

December 30, 1948

Present: Murray, Wells, Hobson, Waite, Allin, Cowden, Wellman, Norton, and Simerl.

W. G. Murray opened the meeting and presented his report as President for 1948, and it was accepted. L. J. Norton reported that the tellers had reported to him that the following were elected as officers for 1949: President, Oris V. Wells, Bureau of Agricultural Economics; Vice-Presidents, Bushrod Allin, Bureau of Agricultural Economics, and Thomas Cowden, American Farm Bureau Federation; Secretary-Treasurer, L. H. Simerl, University of Illinois.

This was accepted and made a matter of record. Murray suggested that various departments of agricultural economics be notified of the new officers and of the dates of the 1949 annual meeting.

President Wells took the chair. An agenda for the meeting was presented and adopted. The past Secretary-Treasurer presented his annual report and the report of the Investment Committee. These were accepted. He also submitted the auditor's report which was accepted.

The following resolution was adopted:

"RESOLVED, that the Secretary-Treasurer, who is also chairman of the Investment Policy Committee, be and is hereby authorized and empowered for, and in the name and on behalf of this Association to take any and all such steps, and to do any and all such things as may be necessary, required, and appropriate for, or in connection with, the purchase, acquisition, acceptance, handling, pledging, sale, or other disposition of stocks, bonds, and other securities belonging to the Association or pertaining to its business including the execution and delivery for and in the name and on behalf of this Association, or any and all endorsements, transfers, and assignments of certificates of stocks, bonds, or other securities standing in the name of this Association, either for the purpose of sale or transfer, and all such other steps and action as may be necessary or proper in connection therewith."

The Champaign National Bank of Champaign, Illinois was designated as depository of the Association's funds.

The Committee approved a motion to provide for the bonding of the Secretary-Treasurer and his secretary.

The Editor presented his report which was accepted. The following resolution was unanimously adopted: The Committee on behalf of the Association expresses its commendation of the excellent work of Dr. Warren C. Waite as Editor of THE JOURNAL OF FARM ECONOMICS.

Walter W. Wilcox was appointed Editor of THE JOURNAL OF FARM ECONOMICS, for the ensuing year. A sum of seven hundred and fifty dollars was appropriated for technical editorial services (subject to review by the Executive Committee in August). The Editor was authorized to appoint two Assistant Editors.

A budget was adopted as follows:

PRO FORMA BUDGET FOR TWELVE-MONTH PERIOD

Income	
Dues	$11,030
Back numbers sold	1,000
Reprints sold	300
Dividends and interest	2,000
Advertising	100
Total	$14,430
Expenses	
Printing the JOURNAL	$ 9,000
Reprints	900
Annual meeting	500
Back numbers	200
Best article award	100
Editorial expense	750
Executive Committee	300
Library custodian	25
Office supplies	120
Postage and wires	200
President's expense	150
Secretary's expense	1,550
Materials for agricultural policy volume	300
Index	150
Contingent reserve	185
Total	$14,430

A sum of $1,500 was appropriated to defray a part of the costs of stenographic and clerical services in the office of the Secretary-Treasurer.

The Committee agreed to present to the members of the 1949 annual meeting the proposition of charging a registration fee of $1.00 at subsequent annual meetings.

It was agreed that extra copies of the 1949 Proceedings issue of the JOURNAL would be made available to the Western Farm Economics Association at a reasonable cost to be determined by the Editor and the Secretary-Treasurer of the American Farm Economic Association and the President of the Western Farm Economics Association.

The consensus of opinion of the Executive Committee is that: (1) The program suggested by the Special Awards Committee is too ambitious to be administered efficiently, at least in the first year; (2) the undergraduate essay proposal is impractical of administration; and (3) that the topic of agricultural policy should not be used for at least another year or two.

It was agreed that necessary expenses incident to the meritorious awards be met from the awards fund.

For the first year awards were approved as follows:

I. Published report of research	
A. First award	$ 500
B. Special awards, three at $100 each	300
II. Doctor's thesis	
First award	250
B. Special awards, two at $100 each	200
Total	$1,250

Reports of research submitted must bear a publication date of 1946, 1947, or 1948, and be readily available in quantity. Each of the awards in this group shall be in different fields.

Doctor's theses submitted for awards must have been accepted by the student's institution during the three years 1946, 1947, and 1948. Theses shall be submitted through the appropriate department head at each institution and only one thesis shall be accepted from each institution.

No paper shall receive more than one award, but a published Doctor's thesis may be submitted in both classes.

For some time the Association has accepted graduate students as junior members. In order to provide definite constitutional authorization for this practice the Committee agreed to submit the following amendment to the members: "The Executive Committee may establish a junior membership open only to graduate students. The annual dues for such membership shall be $3.00 per year."

The Committee approved the participation in joint sessions with the American Economic Association in New York in 1949. The President was authorized to proceed with necessary arrangements.

It was recommended that the President appoint a marketing committee to work with the American Marketing Association.

The 1949 annual meeting will be held at the University of Wyoming, at Laramie, August 17 to 20.

The Executive Committee authorized the President to appoint a Membership Committee.

The members of the Executive Committee present unanimously agreed to hold the 1950 annual meeting at Montreat, North Carolina.

L. H. SIMERL, *Secretary-Treasurer*
ORIS V. WELLS, *President*

THE SOUTH AFRICAN JOURNAL OF ECONOMICS

EDITORS

C. S. RICHARDS
(Managing Editor)

W. J. BUSSCHAU — DR. H. M. ROBERTSON

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